Bob Cooper's

SEPTEMBER 15 2003

SatFACTS

MONTHLY

Reporting on "The World" of satellite television in the Pacific and Asia

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our TENTH year!

COOP'S COMMENT

September 15, 2003

"Not merely a pretty face."

This is Volume Ten (as in the start of year number 10) for SatFACTS. Not many one-person publications last this long and in fact while SF has the appearance of being a one-man show, it is actually two person. Gay VanZandt Cooper is more than a name on the 'masthead' (lower left). She makes this work, while simultaneously operating our family owned cable TV system, raising our now 8 year old son (including home schooling Seth), and monitoring I take all of my ever growing stack of prescription pills each day. On the cover this month, an example of her cable TV system involvement.

It was a dark and dreary wet Sunday morning and CNN and other PAS-8 services had stopped overnight. It took me five minutes to decide the LNB had quit. The dish was wet and rain kept pouring down; I was voting to "wait it out," but not Gay. "*Give me the replacement*" she demanded, appearing in grey dish climbing clothing matching the weather.

In fair weather, changing out an LNB by standing in the 3.7m dish is not a big deal. In the rain, the primary trick is to get the new LNB bolted to the flange without allowing the probe cavity to fill up with water. "*John* (Taylor - our lone employee) *is on the way - he can steady the ladder for me.*" And off she went. I was not yet up to the day's speed having just swallowed a handful of pills; they'd take an hour or so to kick in.

I met Gay on the island of Providenciales from whence we came to New Zealand in 1990. She owned a 37 foot sailboat and I had given her a "temporary job" running some TV broadcasting equipment I operated there for our island cable system. Her credentials were overkill - a degree in communications from the University of California (Santa Barbara). How often do you meet a talented, delightful to be with, attractive woman who knows ohm's law and Morse Code (she also holds ham radio licenses). Or who can change out LNBs by standing inside a rain drenched dish during a downpour.

The last year she worked for me on Providenciales, together we built a VHF two-way radio repeater system which was gifted to the local police department (their first handheld radio system), dealt with daily management of a 30 channel cable system featuring 11 metre dishes and 100 miles of overhead cable, and turned on a trio of new FM radio stations.

"*More than a pretty face?*" Indeed, yes.

Last December, Gay, Seth and I were invited back to Providenciales for ten days to attend a dedication ceremony built around a new multi-million dollar headquarters for the cable system we built together. It is now 75 channels, fibre-optic two-way, and delivers 10 Mbps Internet to homes that in 1980, when I first moved there, did not have electricity. Nor indoor plumbing. Some of us leave a small mark behind; I, with Gay's able and total dedication will be one of those.

In 1994, the year before Seth was born, Gay and I made a visit to my long time friend (Sir) Arthur C. Clarke at his home in Sri Lanka. That's Gay with Sir-Arthur, above. Although 20 years my senior, he could still whip my butt in table tennis. It was Gay's first visit to Sri Lanka and Arthur's home. "*There I was sitting on the couch discussing the motivation behind the various pseudo-characters on Star Trek with the smartest man I will ever meet,*" she recalls with a certain glint in her eye.

As long as she keeps me on my medication, and it continues working, I'll have my own glint in my eye - for Gay VanZandt Cooper.

In Volume 10 ◆ Number 109

Departments

-On the cover-

"*Not merely a pretty face.*" See above.

LETTERS

Tell me more

"Thank you for your recommendations concerning sources for TVRO receiving hardware. As a newbie, I have many questions which perhaps have been dealt with previously (before my subscription began). For example: (1) What is known about the future encryption system for Australia pay-TV? (2) The dish I have purchased is longer than it is wide and the feedhorn is offset down low. Should it be mounted with the long side horizontal or is that just for horizontal polarised signals? (3) Is there a similar publication to SatFACTS dealing with cable TV?"

GLD, NSW

Australian pay-TV encryption. Austar is migrating from one Australia-unique (Fast-I) to another world class (Euro-I) Irdeto (brand name) encryption. They recently completed replacing the original Pace (brand) DGT400 receivers with newer UEC (brand) Titan/Atlas or G3 decoders because DGT400s cannot handle the (newer) Euro-I format. One of the claimed advantages of Euro-I is an ability using Irdeto 2 to "pair" the receiver's unique serial number with a smartcard's equally unique serial number, thereby reducing (they hope eliminating) card piracy. Foxtel, meanwhile, is abandoning Irdeto totally, and will spend hundreds of millions of dollars to replace every existing Foxtel satellite receiver with a new NDS encryption format receiver. NDS on an anti-piracy capable measurement is a '9' while Irdeto hovers around a 4. Sometime in 2004, Foxtel will roll out hundreds of thousands of new set-top IRDs replacing the present (largely UEC) Irdeto boxes. Meanwhile, Austar and Foxtel have been transmitting parallel (simultaneous) addressing streams using Fast-I and Euro-I, and there has been experimentation with NDS as well. Over on Aurora, as no DGT400s were ever legally sold for this service, there is only Euro-I. Many non-UEC receivers currently running on Aurora may have serious problems (as in no longer working) when Optus switches off Euro-I version 1 for version 2 on Aurora.

If your antenna was designed for two or more simultaneous satellites, it might be toroidal; a "spherical" design antenna created by taking/cutting a segment out of a parabola and fine-tuning the shape to match or work best with a custom designed feedhorn + sub-reflector electrically tracing the toroidal "shape" through a sub-reflector. Number one advantage of a toroidal/spherical: Ability to place two or more separate LNBs out front, each positioned so that without physically moving the dish, reception from different satellites is possible. Toroidal's install long-way horizontal without respect to the polarity of the incoming signal. Toroidal as best we can determine is an unregistered trademark / product name and it (the word) has its' basis in a geometric "toroidal shape" (Torus) rather than in the name of a creator (i.e., a "yagi" was named after Dr Yagi, a Japanese scientist of the 1930s); there was no "Dr Toroidal." See p.22, here.

FTA TV3, 4, Prime?

"Doing commercial building Wellington; TV1, 2 are FTA but TV3, 4, Prime require Sky subscriptions. Anyway around this - terrestrial reception here is very poor."

Glenn Fitzgerald, Wellington

Afraid not; $17.29 per month per channel. Pay it.

PROGRAMMER PROGRAMMING PROMOTION UPDATE

SEPTEMBER 15, 2003

Rugby World Cup. Seven Network, Australia, will provide detailed statistics and background material on teams and players as its contribution to DVB-T technology during broadcasts of RWC there. In New Zealand, the answer is "no" to those asking for widescreen (16:9) coverage through TVNZ's RWC FTA channel (Optus B1, 12.456Vt). TVNZ explains, "We are not yet satisfied with the performance of 16:9 and after the RWC coverage (October 10 - December 20) we will revisit this technology with further testing (using the RWC channel space)." No, that does not mean TVNZ will follow RWC with a "sporting channel" on FTA as some have reported. Scheduling: TVNZ plans to post a web-site schedule of the RWC FTA channel but generally it will go as follows: Previous night's TV ONE carried/RWC parallel games will restart in replay mode around 8AM (i.e. Monday night coverage will repeat starting at 8AM Tuesday). RWC will continue operating for approximately one month after RWC "live final" match - recreating the full series, ending up around 20 December.

Sky has responded to the TVNZ RWC channel, "FREE RUGBY." For all the rugby fans out there, and we know there's a few of you, SKY has a special offer. The Rugby Channel will be available to all SKY Digital subscribers every weekend, from 6 AM Friday to 6 AM Monday during the Rugby World Cup where the (Sky) Rugby Channel will be showing classic All Black's encounters with their traditional foes.

TVNZ denies there is a RWC. Strange but true. A new Maori TV broadcaster hoping to be first on-air with programming ahead of national MTS net has requested TVNZ permission to take 3AM - 4 PM satellite fed block of RWC for terrestrial rebroadcast over a small community. This would be the "day chunk" when TVNZ is not carrying RWC on TV One, the national network. TVNZ response: "*We don't know what you want to do - there is no such thing as a Rugby World Cup Channel!*"

RWC promotion. Chris Clark, installing dealer in Napier (NZ), reports: "I placed advertising in Hawkes Bay Today sporting pages (35,000 circulation); 17 telephone calls, 2 possible sales. Responses from public 'not friendly'; examples. 'How can you say it is free to air if I have to buy a new receiver?' 'Why should I have to pay more for this - I already pay Sky for Sport 1, Sport 2 and the Rugby Channel???' Rugby fans are not the most cordial on the telephone!"

NZ supplier Clayworth Electronics (09 444 9393) offering 90cm Ku offset dish, Acer (brand) LNBf for NZ$111 (+gst, crating, shipping); Winersat Digibox 200 for reduced pricing ($195 + GST). Sales for Globecast FTA (and Indian) services continue to happen according to FTA installers.

Arirang TV (Korea), As3S 3755Vt asking affiliated users how their signal would be better/same/worse if they moved off of present satellite (As3S) to PAS-8 or PAS-2. Our suggestion: Move to As4 (122E) and start the ball rolling there!

MTS/Maori Television Service has run into another snafu in NZ. Sky has offered it a no-charge spot in digital bouquet although that would mean viewers would be required to install a Sky Ku system and pay $17.29 per month for equipment rental. MTS wants combination of UHF terrestrial TV using out-of-service analogue transmitters previously operated by TVNZ and TVNZ FTA satellite distribution. Government remains undecided which path to follow.

INL, which already owns 60+ percent of Sky NZ, is buying up the balance in a complex deal that includes cash plus shares in INL for present holders of Sky TV public stock. Bottom line: Sky NZ comes off the NZ stock exchange, making it "private:" and its' financials no longer subject to scrutiny of the stock exchange administrators. A neat way to hide what's *really* happening!

Great idea

"The list of frequencies and PIDs for C1 (SF#108) was a great idea; could you do the same thing for B1 and B3? Living here in NZ, which of the Australian intended services which require a one-time card purchase can be purchased and used 'legally' in NZ? I read with interest the 'CardView' comment concerning the proposed ImpactTV service and if there develops a service package on B3 (Impact), along with B1 (TVNZ, ABC) and C1 (The Globecast plus perhaps Aurora services), I foresee a single shaped dish with three LNBFs as becoming a 'standard' for NZ"

CC, NZ

Australian CardView (such as the one-time-purchase Aurora card) is not sold in or to New Zealand because the services for which it operates (such as SBS) have not been licensed by their programme suppliers for New Zealand viewers. Technically, the CardView system is not pay-TV; it is "restricted coverage TV." This makes it a "grey market" (not a criminal offence but in violation of somebody's stated business plan) item. Aurora (SBS et al) services use Euro-I Irdeto encryption and any Irdeto capable IRD equipped with am embedded or external V2.06 or V2.09 CAM will, when a card is added, work assuming the dish + LNB(f) are suitable. The number of people so-equipped in NZ is very small - 100 would be a large guess - and for the moment at least presents no "threat" to any other service provider (such as Sky NZ, TVNZ, or SBS itself).

Sky NZ for TVNZ FTA?

"Help me understand why if TVNZ's FTA package (two each TV ONE, TV2) are Sr 22.500, FEC 3/4 and Sky's same bird/same polarity CA service is also Sr 22.500, 3/4, a Sky subscriber cannot tune-in the forthcoming RWC service which will become programme channel #5 within the TVNZ 12.456 bouquet/mux?"

Elliot S., Wellington

Technically, every Sky receiver could tune-in the RWC channel. But Sky and TVNZ have not reached a commercial agreement covering this so lacking that "permission" from TVNZ, Sky cannot send a data-bit to its subscriber receivers telling them to unlock and watch the new RWC service. To do so without TVNZ's agreement would amount to 'Grand Theft - Satellite'. A totally standard FTA receiver, however, will tune-in the TVNZ RWC service with no problem. Sky elected to adopt a CA system that not only controls those who don't pay not watching, but in reverse, restricts those who do pay to watching only what SKY sends to them even though other services are available just a data bit away. Think of SKY's approach as placing a Chastity belt on a woman and wearing the key on a chain around your neck.

Loses BBC

"We are satellite TV installers in Tenerife (Canary Islands), Spain. Recently we lost the BBC channels off of smaller (60cm) dishes and now BBC requires a 3m Ku grade dish. We would like to redistribute BBC1, 2 (etc.) from a central point using radio linking over distances as great as 3km. The challenge is the 'master site needs to transmit in a full 360 degree circle to that (3 km) range. Moreover, ideally the transmissions would somehow be 'protected' (encrypted) so that our local competitors don't take advantage of our initiative and simply sell receivers to make use of what we transmit. Is such a system possible and if yes, what are the costs and the likely delivery times?"

David Allsop, Inbelsat SL, Canary Islands

The least complicated rebroadcasting system would use 2.4 GHz off-the-shelf hardware (p. 15 August, p. 10 here). 360 degree coverage is an antenna solution - four yagi antennas in a 90 degree step array would do that. "Protecting" the service from free-to-air viewers is another challenge, not so easily resolved!

HARDWARE EQUIPMENT PARTS UPDATE

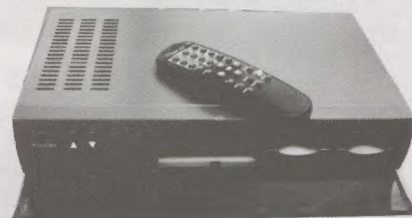
SEPTEMBER 15, 2003

Chasing the Coship legend. Frank, a FTA dealer in Mosgiel (NZ), reports: "I purchased a 3188C from Peter Escher, plugged it in, promptly located Globecast's 12.367 C1 bouquet which is what my client wanted. On a 60cm ex-Sky dish, signal level 80%, signal quality 40% - have yet to read the manual!"

SatWork ST 3618 received for test by SF. Blind Search is ala 3188C but memory is small (1,000 programme channels) and it uses slower Fujitsu processor rather than state of art STi5518. Stay tuned.

The 3188C is gone. According to reports, it is being replaced by a newer model. Tim Heinrichs, the headman at DMS International who first brought us the 3188C, is leading the design programme for a "faster, better, more DXer friendly" version. His first attempt at this, the SatWork ST 3618, arrived in small quantity in the USA early in July and was promptly "rubbished" by Roy Carman (SF#107, 108 with reports on blind search receivers) who found it "totally unacceptable." Carman rushed to the keyboard to announce his findings which, after his initially "discovering" the 3188C (SF#107), had repercussions flowing all the way back to China where the engineering team behind the new receiver decided they had made some mistakes in translating Heinrichs' design criteria. Where are we now, today? Those who have 3188Cs should treat them with respect and lock them up at night. Apparently there will be no more. And the replacement is muddled in !URGENT! emails flowing planet-wide at this point.

Humax power supply failures? One reader reports, "*of 5 Humax 5400 series put into service at same time, 4 have developed power supply problems.*" Checking with importer Sciteq, SF learns their overall 5400 P/S failure rate has been around 1%, "*well within the expected losses for a device of this type.*" SF has traced the apparent component failures to a handful of always-same resistors, capacitors and we are preparing a report on recommended repair strategies. Have you experienced 5400 p/s failures? Let us hear from you (skyking@clear.net.nz)

New Zealand government asking for submissions to help it map a transition from present analogue to future digital broadcasting service. What seems to be escaping almost everyone involved is as follows: Digital terrestrial or digital satellite is not digital; it is digital-through-the-air only as far as the set-top box. Then it becomes analogue once again. The benefits are to the broadcaster, only marginally (if at all) to the viewers. True digital - from studio camera to display screen will require every viewer to tip their present analogue TV set, analogue VCR and buy new digital reception equipment. Broadcasters say they can "convert to digital" (transmission) platforms for around NZ$8 million. Not likely of course. More importantly, what about the 1 million homes forced to spend NZ$1,000 up (way up!) to replace their TV and VCR equipment? Yes, that works out to NZ$1,000,000,000; a pretty nifty "shift" of analogue to digital transition costs from broadcasters to consumers. Even if nobody bought new digital gear, a digital STB at NZ$400 for each TV set and VCR still pushes at least NZ$400,000,000 consumer cost. TV retailers rejoice!

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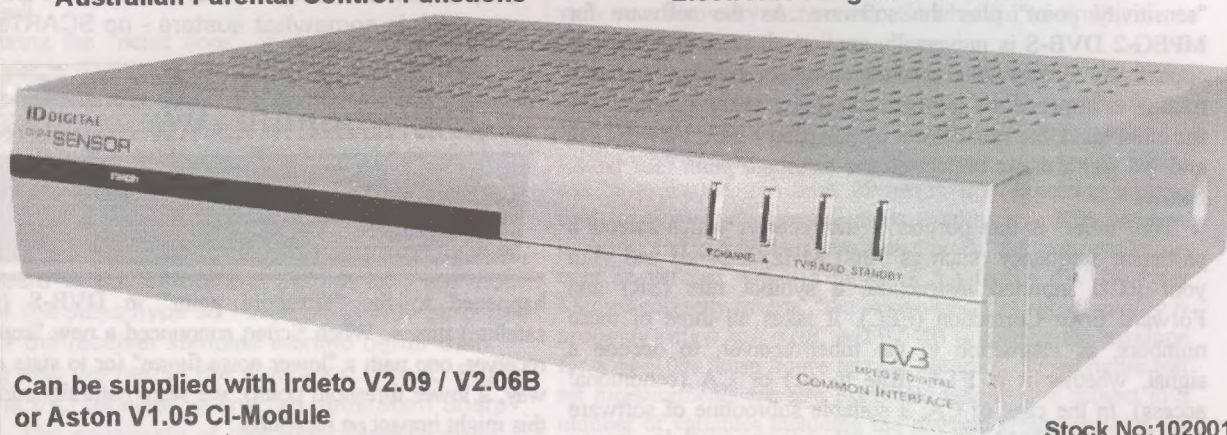
Introducing the NEW

ID Digital CI-24 Sensor

G3 Super Sensitive Tuner

Features:

- **Common Interface slot for Irdeto 1 & 2, Seca / Mediaguard, VIACCESS, Nagravision, Conax Cryptoworks and more.**
- **1 - 45 Msym Symbol Rate**
- **Super Sensitive Tuner**
- **4:3 or 16:9 aspect ratio**
- **Automatic Search for Asia/Pacific Satellites**
- **Australian Parental Control Functions**
- **Software upgradable from home PC**
- **Latest software FREE on the web**
- **DiSEqC 1.0 switching**
- **DiSEqC 1.2 positioning**
- **22kHz Switching**
- **SCPC & MCPC from C / Ku Band**
- **Supports DVB Subtitling & DVB Teletext**
- **Electronic Programme Guide**

Can be supplied with Irdeto V2.09 / V2.06B or Aston V1.05 CI-Module

Stock No:102001

Conditional Access Interface	
PCMCIA	1 Slot Common Interface
Tuner & Channel	
Input Connector	F-type, IEC 169-24, Female
Frequency Range	950 ~ 2150 MHz
Input Impedance	75 Ω unbalanced
Signal Level	-25 ~ -65 dBm
IF Frequency	Zero - IF
LNB Power & Polarization	Vertical: +13.5 V Horizontal: +18 V Current: Max. 500 mA, Overload Protection
22 kHz Tone	Frequency: 22±4 kHz Amplitude: 0.6±0.2 V
DiSEqC Control	Version 1.0/1.2 Compatible
Band Switch Control	22kHz Tone
Demodulation	QPSK
Input Symbol Rate	1 - 45 Msym
FEC Decoder	Convolutional Code Rate 1/2, 2/3, 3/4, 5/6 and 7/8 with Constraint Length K=7
MPEG Transport Stream A/V Decoding	
Transport Stream	MPEG-2 ISO/IEC 13818
Profile Level	MPEG-2 MP@ML
Input Rate	Max. 15 Mbit/s
Aspect Ratio	4:3, 16:9
Video Resolution	720 x 576 & 720 x 480
Audio Decoding	MPEG/MusiCam Layer I & II
Audio Mode	Single channel/Dual channel Joint stereo/Stereo
Sampling Rate	32, 44.1 and 48 kHz

Memory	
Main Processor	ST ST20C2+(81MHz)
Flash Memory	1 Mbyte
Graphic & System DRAM	8 Mbyte
A/V & Data In/Out	
VIDEO	RCA/Cinch, Video Output (CVBS)
AUDIO R/L	RCA/Cinch Volume and Mute Control (Resolution: 20 bits DAC, Max. 2 Vrms)
RS 232C	Transfer rate 115,000bps 9 pin D-sub Type
RF-Modulator	
RF-Connector	75 Ω , IEC 169-2, Male/Female
Frequency	470 ~ 860 MHz
Output Channel	CH21 - 69 for the Remodulator
TV standard	PAL B/G/I/D/K selectable by Menu
Power Supply	
Input Voltage	90 ~ 250 VAC ±6%, 50 Hz/60 Hz
Type	SMPS
Power Consumption	Max. 28 W
Stand by Power	≤11 W
Physical Specification	
Size (W x H x D)	260 x 50 x 180 mm
Weight (Net)	1.3 kg

Down into the noise -

We test the new low-noise Sharp tuner in ID CI-24 Sensor IRD

SMALL package (257mm width); lower front panel folds down revealing (Irdeto) CAM insert slot. Rear deck is somewhat austere - no SCARTs.

What does "low noise" mean?

SatFACTS first visited the digital threshold world in SF#7 (March, 1995) where we established that "digital threshold" - the point where pixelations or errors stopped, was at that time around a Carrier to Noise (C/NR) Ratio of just under 6 dB. As we have subsequently learned over 8 years, digital threshold is a mercurial kind of point depending largely on the quality of the LNB(f) and more importantly upon the Forward Error Correction (FEC) employed by the broadcaster.

Every receiver's threshold is internally determined by the "sensitivity point" plus the software. As the software for MPEG-2 DVB-S is universally applied, there is little (or no) opportunity for individual receiver designers to "play" with that routine to improve the ultimate sensitivity of the receiver. On the other hand, the broadcaster by selecting a FEC between 1/2 and 7/8 has a direct impact on the threshold point (see table, below).

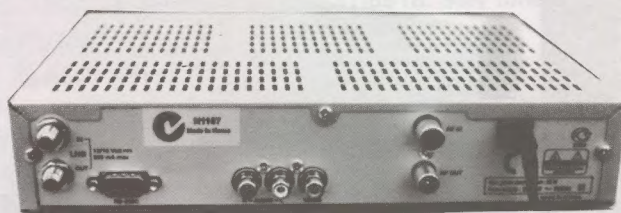
The "tuner" is that portion of the receiver which selects a particular frequency (such as 1260 MHz; L-band) and with your RCU inputted instruction, a symbol rate (SR) and Forward Error Correction (FEC). It takes all three of these numbers, as instruction to the tuner/receiver, to decode a signal, whether it is FTA (free to air) or CA (conditional access). In the case of CA, a suitable subroutine of software (involving a CAM / conditional access module or an "embedded processor") is also required to decrypt the transmission after the actual "reception."

In theory, if a tuner has a lower internal "threshold" the receiver will produce pixelation-free images (and companion sound) with a lower C/NR.

C/NR is carrier to noise ratio - the carrier is what we want, the noise is the culprit. If there is less noise generated inside of the tuner, the receiver will lock onto and display DVB-S signals which others with a higher noise figure will not display. Ideally, a tuner would have no noise at all; there is no such device. All tuners have a "noise floor" (an internally generated noise floor which DVB-S signals must exceed before they can be processed without impairment).

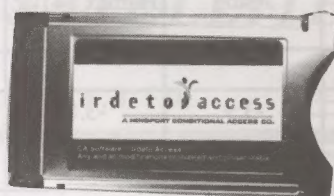
The tuner's "threshold" point is measurable - by something called "noise figure." A noise figure of 5 (dB) is superior to a noise figure of 6 (dB) simply because the lower the noise figure, the more sensitive the tuner.

Tuner "noise figure" is seldom (if ever) specified in a receiver data sheet. Some receivers specify the "range" of input signals they will process (such as -25 dBm to -65 dBm) but even that "number" is quite meaningless in the real world if you lack of very specialised test equipment required to verify the stated range. -25 dBm is a reference number; 0 dBm is a big time signal, far more than you really require for suitable signal reception. -65 dBm is a quite weak signal, being 65 dB weaker than 0 dBm.

From the first "tuner noise threshold tests" we reported in SatFACTS back in 1995, to today, very little has really happened to the "threshold point" in DVB-S (MPEG-2 satellite) tuners. When Sciteq announced a new "super tuner" receiver, one with a "lower noise figure" (or to state it another way, a lower threshold point), we were naturally curious how this might impact on reception.

Internal noise versus threshold

There is virtually no hard reference material to guide you here. Does a receiver tuner with a "noise figure of 5.5 dB" reduce the receiver's threshold point by 0.5 dB when directly compared to a competitive receiver with a "noise figure of 6.0 dB"? The answer is murky, at best, and apparently not quite so numerically simplistic.

Frankly, SF #7 did the best job of exploring this unknown world at a stage where the only receivers available were manufactured for the original ABS-CBN by the USA "Jerrold" (or GI Corporation). There we found a carrier to noise of 5.5 dB locked, a carrier to noise of 5.25 did not. However those rather ancient tests cannot be translated to today because the original ABS-CBN system transmitted in MPEG 1.5, and, the FEC was 1/2. Neither of these can be compared directly to today's MPEG-2 and FECs of 2/3 or 3/4 (standards used by Globecast, Aurora and Foxtel/Austar). Further, at the time,

FEC Rate	BER at threshold	Improvement in threshold	Analogue reference notes
1/2	7.0E2	+0.7 dB > 2/3	+4.2 dB 7/8
2/3	3.6E2	+1.0 dB > 3/4	+3.5 dB 7/8
3/4	2.1E2	+1.0 dB > 5/6	+2.5 dB 7/8
5/6	1.2 E2	+1.5 dB > 7/8	+1.5 dB 7/8
7/8	7.7E3		same as analogue threshold

OPEN Sesame to accessing many Australian CA services when paired with appropriate authorised smart card. Irdeto 2.06B CAM manufactured by SCN Microsystems (Singapore) carries warning; "Reprogramming is prohibited!" CA makes threshold higher, more difficult to measure.

"CA" was only occasionally employed - the broadcasts were FTA, relying upon the "scarce-as-hen's-teeth" receiver world to maintain a lid of unauthorised viewing. My - how the world has changed!

Measuring the "noise floor" of a receiver, such as the Sciteq-available ID Digital CI-24 Sensor reviewed here, is a dangerous exercise. But comparing the "threshold point" with other receivers is relatively simple provided you pay attention to some detail. Peter Merrett of Sciteq, in advance of providing a CI-24, wrote to SatFACTS:

"The ID Digital guys at the show in London were pushing the sensitivity of the Sharp tuner in this unit. I have heard all this before and did not take too much notice of the sales hype so I was pleasantly surprised when the receiver samples worked better than anything else we had in the workshop. The ID Digital CI-24 is a CI receiver with a 3rd generation Sharp tuner. The sensitivity of this tuner really is quite remarkable. Signals that were showing 20 % signal quality and were starting to pixelate on other receivers are now rock solid with signal quality around 50% on the CI-24. The 20% to 50% improvement in signal quality is probably only half a dB in signal to noise terms but no question it is much better."

Not everyone found the same result. Receiver sales competitors Leon Senior (Strong Technologies Ltd) and Garry Cratt (Av-comm Pty Ltd..) had these comments.

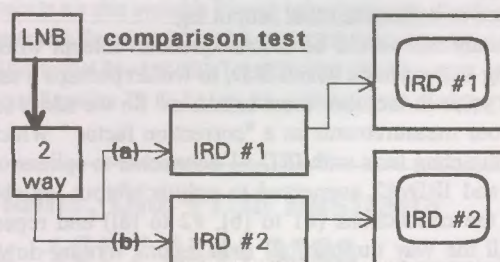
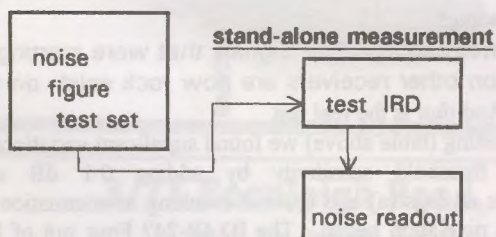
Leon Senior: "Strong receivers have been using a high sensitivity tuner for several months, now."

Garry Cratt: "Tried one this morning after glowing reports from Sciteq. Using Insat 3A (91.5E) where signals are just on threshold, performance is absolutely no different to a standard Av-comm FTA receiver."

Obviously there are some differences of opinion here and perhaps some understandable "tension between competitors." Which is why there is a SatFACTS - to provide an independent view on controversy such as this. So what did we find?

How you measure it ...

Given suitable test equipment, skills and care to repetitive detail, the actual noise figure (measured in dB or noise figure Kelvin) can be determined. Such a measurement is categorised as "stand alone" because only one device (IRD) can be evaluated at a time. However, it is expecting a great deal to verify such measurements within a +/- 10% window meaning that if 6.0 dB is our "benchmark" the test results can only be verified within a range of 5.4 to 6.6 dB. As Peter Merrett correctly asserts, "*the improvement in signal quality is probably only a half a dB*" and 0.5 dB is pushing the envelope for a +/- 10% noise figure test set accuracy. Noise figure test set measurements are also extremely tedious and subject to a number of variables including the physical temperature of the equipment, the air surrounding the equipment, the humidity percentage at the time of test and even the "oxide coating" on test cable (connection pins) used - to mention but a few of the challenges. In the final analysis, "stand-alone" measurements are useful but hardly the be-all, end-all for proving (or not proving) a "1/2 dB improvement in receiver sensitivity."

It happens there is a more useful approach which lends itself to your "real world" because you can do it yourself with devices you already have on your work bench; comparison testing. "Comparison testing" is a direct challenge between any two IRDs you have handy. In theory it is as simple as connecting both IRDs to the same antenna/LNB simultaneously through a 2-way splitter (below). In practice there are cautions - significant cautions and procedural steps which must be followed or you cannot expect "repeatable results." In the end, you will know which IRD is most sensitive under what conditions, or, as Garry Cratt notes about his own tests, "*performance is absolutely no different*" between his IRD and the anticipated "better tuner" version.

Where pixelation first occurs - (apparent threshold by cranking in attenuation in 0.1 dB steps)

C/NR region	Parameters	Connection (below)	SRT 4800 II	Av-comm Xanadu (*)	Aston	Humax 5410Z	ID CI-24
	As2						
10 dB	Sr 28.125 FEC 3/4	Th (a)	-4.0	-3.7	-3.9	-3.8	-4.1
	Euro Bqt	Th (b)	-4.1	-3.8	-4.0	-3.8	**-4.3**
12 dB	Sr 20.400 FEC 1/2	Th (a)	-5.8	-5.2	-5.9	-5.7	**-6.2**
	WorldNet	Th (b)	-5.8	-5.4	-6.0	-5.9	-6.1
9 dB	Sr 8.397 FEC 3/4	Th (a)	**-3.0**	-2.9	-2.6	-2.7	-2.8
	Inner Mong.	Th (b)	**-3.0**	-2.8	-2.7	-2.9	-2.7
	As3S						
11 dB	Sr 4.418 FEC 7/8	Th (a)	-5.0	-4.1	-4.4	-4.6	**-5.2**
	Arirang	Th (b)	-5.1	-4.0	-4.6	-4.6	**-5.2**
	As2						
8 dB	Sr 2.626 FEC 3/4	Th (a)	-2.3		-2.5	-2.2	-2.5
	Fashion TV	Th (b)	-2.3		**-2.6**	-2.3	**-2.6**

* / Xanadu is not the current Av-comm product available but it happened to be the IRD we had on hand for testing from this firm and has been a consistent good performer. This IRD would not load Fashion TV.

The diagram (bottom, right hand side) p. 7 illustrates how you can rather simply do your own comparison testing. Logical? Not quite. First there is the matter of 2-way splitter integrity. We assume, because we expect it to be so, that when a signal voltage is delivered to the input of a 2-way splitter that each output will be half of the input, less whatever splitter losses as may occur. Putting that into straight numbers, we deliver "10" to the input and we *expect* "5" at each of the two outputs. Only there is more to splitting than dividing by two; there are circuit losses. So what starts out as 10 becomes not 5 + 5 but in fact more like 4.7 and perhaps 4.6. The difference between 5 + 5 and 4.7 + 4.6 is "splitter circuit losses."

2-W

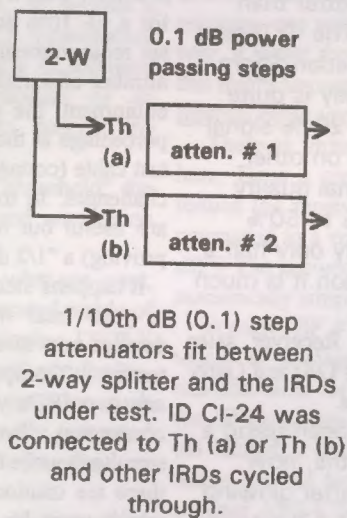
0.1 dB power passing steps

Th (a) — atten. # 1

Th (b) — atten. # 2

1/10th dB (0.1) step attenuators fit between 2-way splitter and the IRDs under test. ID CI-24 was connected to Th (a) or Th (b) and other IRDs cycled through.

Note that 4.7 is not the same as 4.6. If we lost precisely as much from input to output (a) as we lost from input to output (b) the splitter losses would be balanced (comparison diagram, p. 7); what we have at the outputs, if equal, is what counts here. But they seldom are equal. Therefore the output leg with the higher through loss is handicapped - it delivers less signal to the device (IRD) connected to it than the other output leg.

Normally this would be inconsequential. Except when you are trying to determine which IRD, to within perhaps a tenth of a dB or so, is in fact the "most sensitive." So we add a second step to our measurements as a "correction factor." Which is - after completing tests with IRD #1 connected to splitter output leg (a) and IRD #2 connected to splitter output leg (b), we reverse the connections (#1 to [b], #2 to [a]) and repeat the tests. All the way through, all over again. Writing down the observations, of course. And as Garry Cratt notes, *"do your measurements on a weak satellite* (C or Ku is not a factor here) *where there are transponders that normally won't load or better yet, load only sporadically."*

Note on p. 7 we have a two-way followed by two IRDs (under comparison test) and then two monitors. "Time" is an element here, especially with signals that are right on the edge of locking anyhow. The IRD # 1 versus IRD # 2 tests must be done live, real time, side by side. First with IRD #1 connected to (a) and then reversed with IRD #1 connected to (b).

Peter Merrett, quite properly, reported, "Signals that were showing 20 % signal quality (on a comparison receiver) were around 50% on the CI-24." Can't you merely read the independent receiver's "signal quality" meter and determine which is best? Not quite. "Signal quality" is a relative display unique to each receiver's design. What one manufacturer's software elects to call 20% a competitor could just as easily call 50%. There is nothing sacred nor dependable about signal quality readings.

But Merrett also reported, "Signals that were starting to pixelate on other receivers are now rock solid on the CI-24." And *that* is the real test.

In our testing (table above) we found significant variations in apparent threshold sensitivity by adding 0.1 dB step attenuators on legs (a) and (b) and cranking in attenuation on each until pixelation began. The ID CI-24? Four out of five tests said it was best. But not by a great deal.

Licence Free takes on new meaning-

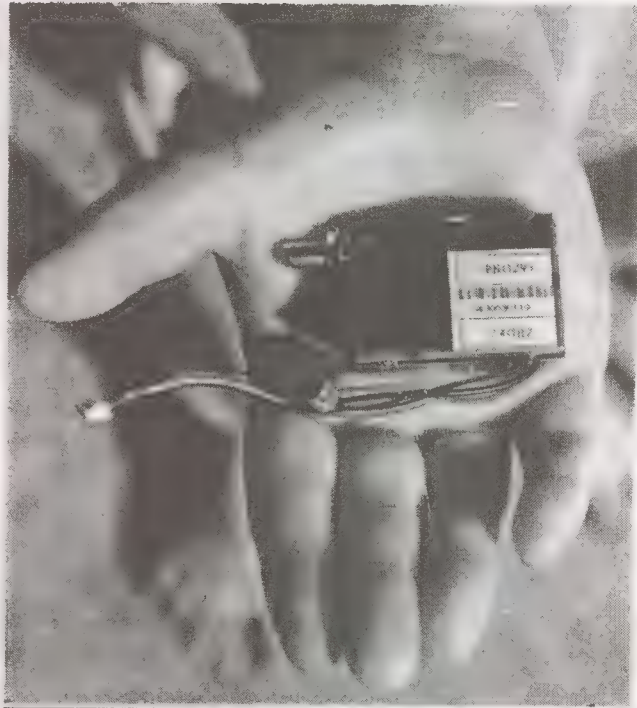
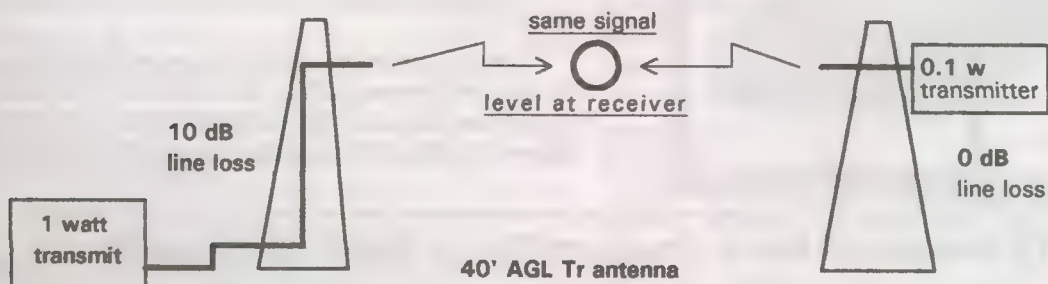
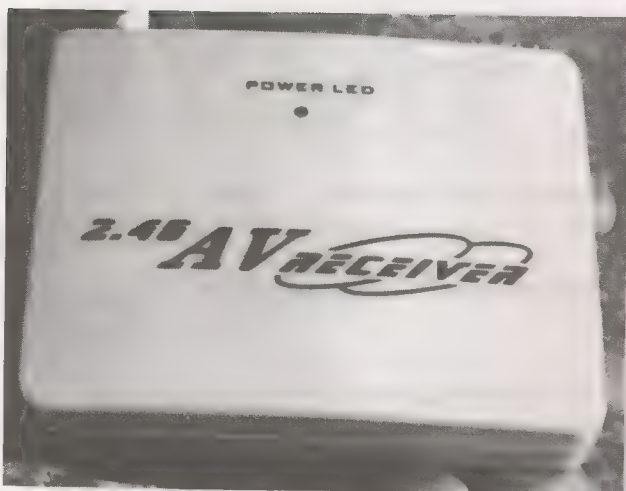
Part Two: What you need to know to install 2.4 GHz video links

"I had a play this weekend with some 2.4 GHz gear. Using ex-Galaxy MMDS (24 dBi claimed) antenna for transmit and 16 dB gain receiver antenna, and only 10 mW of transmitter power, no problem reaching 7 - 8 km LOS" (**AI**, Victoria).

"My TVRO mate is 2 km from me and from his roof he can 'see' my roof. He wants to link the two sites together so that I can 'share' with him what he finds with his extensive dish and IRD system" (NS, NSW).

These are typical (out of more than 40 received) responses to our 'part-one' report appearing in SF#108 ("2.4 GHz links using Licence Free off-the-shelf hardware"). SatFACTS is investigating the hardware, and the terms of "no licence required"' use, of the 2.4 (2.400 - 2.483[.5] GHz region which our own tests validate can be easily used over distances in the 20 km-plus range provided you have LOS (line of sight) between the transmitter and receiver(s). This is truly a quick, easy to implement, hassle-free way of "sharing" video and audio signals with neighbours and not-so-close folks who have an interest in what you can create from your satellite receiver or other audio (A) / video (V) source equipment.

Different political jurisdictions (i.e., countries) have varying "rules" concerning use of the 2.4 GHz region with "plug and play" equipment. New Zealand, for examples, allows 1 watt eirp (effective isotropic radiated power) maximum while Australia allows 10 mW (milliwatts) but this can be beefed up with higher gain antennas. 1 watt to an isotropic antenna is the equivalent of 100 milliwatts to a 10 dB gain antenna (at the transmit side). Neither Australia nor New Zealand have regulations which limit the size or gain of the *receive* side antenna which means whatever the shortcomings might be with the actual transmitter power, often you can make up for that limitation with an higher gain or amplified receive antenna.

2.4 GHz is shared with many wireless devices including wireless Internet (WLAN, WIFI code named) systems, wireless A/V senders operating at 10 mW power (such as from Dick Smith, Harvey Norman and others). There is an entire family (two, actually) of more power, more sensitive devices (systems) "above" the Smith/Norman consumer grade "wireless A/V sender" grade of equipment, more adaptable to longer distance transmission and more suitable for professional and semipro applications. New Zealand's TAB (racing) coverage channel, for example, contracts out video camera work to a number of firms who individually have selected 1 watt 2.4 GHz transmitters and directional (yagi format) transmit antennas to allow track side cameras spaced around a

0.1 watt (1/10th watt) palm of hand 2.4 GHz transmitter module requires 12 volts, video and audio baseband, connection to transmit antenna.

Model RX-2420 receiver is intended for relatively short range reception even with 1 watt (or higher power) transmitter and directional yagi/"yaki" antenna. More expensive model RX-2400 (below) adds four-channel scanning, second parallel V + A output but receiver is identical in sensitivity to smaller version.

racing venue to cover the event, linking back to the production centre with 2.4 GHz.

The primary world-supplier of 1 watt and higher power (up to 6 watt) solid state 2.4 GHz transmitters is a Taiwan firm known as Lawmate (http://www.lawmate.com.tw). Their products appear in web site listings for Australia's Allthings Sales & Service (www.allthings.com.au) and New Zealand's Merit CCTV (www.meritcctv.co.nz) with quite similar pricing.

The first challenge in any 2.4 GHz link is the transmitter installation. The transmitter, whether 10 mW (as is legal in Australia) or 1 watt (legal in New Zealand), needs to be connected to a suitable transmitting antenna. Lawmate and the two regional sources offer a variety of omni-directional (0 dB gain or less) and directional (up to 16 dB gain) antennas. You would use a directional "gain" antenna when you wished to transmit in a single direction, an omni when you were planning to serve a circle of 360 degrees around the transmit location. The advantage to the directional antenna is it magnifies or passively-amplifies the actual radiated (transmitted) power by its own gain. All 2.4 GHz links are "system-gain-dependent" which means that if you reduce the "effective radiated power" at the transmitter (lower transmitter power, less transmitter antenna "gain"), the distance covered is reduced. Gain can be applied at either the transmit end of the circuit (more power, high gain antenna) or at the receive end (using a higher gain receive antenna, even a masthead amplifier) more or less at will; it does not all have to come from the transmission end of the circuit.

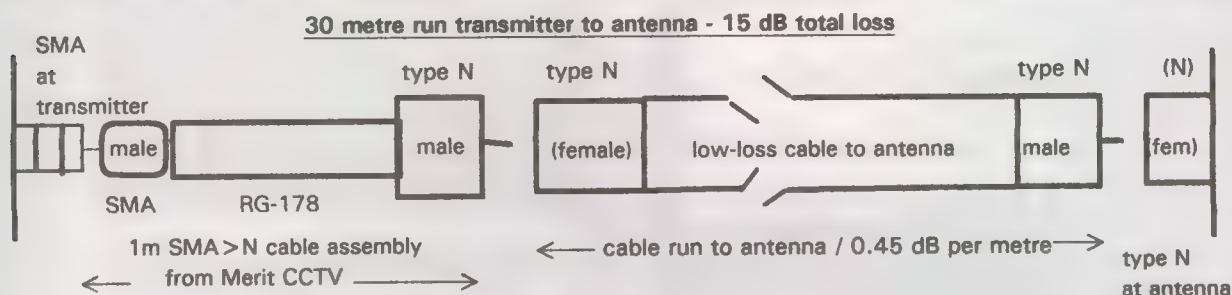
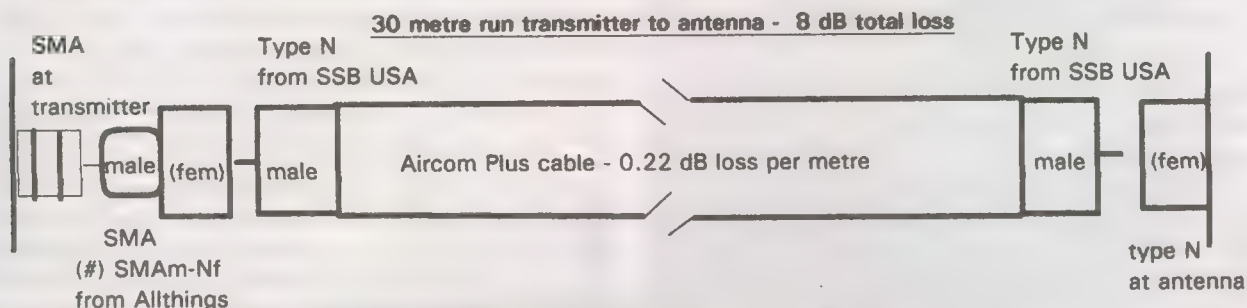
Power to the antenna

As the diagram (immediately left) illustrates, transmitter power is secondary to antenna-input power. At 2.4 GHz, standard transmission lines are very lossy; RG6, for example, in 30 metres of length, loses around 25 dB of transmitter power. How much is that? One-watt at the transmitter becomes 0.05 watt at the antenna. Dissipating power in a feedline is not a good engineering choice if it can be avoided; each time the power is reduced by 6 dB your coverage distance drops in half. If one watt delivered to the antenna had a maximum range of 10km, for example, 1 watt reduced by 25 dB has a maximum range of around 0.5 km. The answer is to either install larger, more efficient transmission line (transmitter to antenna), or, to move the transmitter closer to the transmitting antenna (p. 12).

The connectors

Virtually all 2.4 GHz equipment is provided with a type "SMA" connector. Do not be mislead by their "gold" plating. Nor that they have a physical appearance similar-to F fittings. There is nothing friendly about SMA fittings.

In fact, you need to get out of SMA as rapidly as possible at both the transmit and receive end of the circuit. SMA is a fine connector for microwave when the cable on the end of the fitting has a very short distance (such as 1 metre) to go to reach a transmitter or receiver. SMA fittings fit very small cable with a solid (as in copper-tubing-like) coaxial cable; RG-178. This cable is better than RG6 for the frequencies involved but not much - only more difficult to use and you won't be "crimping" connectors on with SMA.

So the answer, unless the transmitter is within say a metre of the transmitting antenna (or the receiver is within 1 metre of the receiving antenna) is to use a transition fitting and larger (lower loss) cable. There is no such thing as SMA-to-F adapters. There is SMA-to-(type) N and yes, it is possible to use type N fittings that crimp on. Of course this requires a larger (lower loss at 2.4 GHz) cable (such as RG-8U, Air-Core (*). The cable segment, normally a don't-think-about-it quick to do thing at L-band with RG6 becomes a major challenge at

Cable (and connector) "losses" become so significant at 2.4 GHz they cannot be ignored. Allthings (Australia) offers (cable -223/450) lengths of unspecified cable with 0.45 dB loss per metre fitted with type N connectors. (*) SSB Electronic USA (www.ssbusa.com) offers "Aircom Plus" .425" (OD) cable with losses at 2.4 GHz of 0.22 dB per metre; a 25m length is US$71, type N connectors for same US$9.

2.4 GHz where line losses rapidly eat up transmit or receive signals.

It is seldom practical to locate the transmitter at or within 1 metre of the transmitting antenna, or, the receiver within 1 metre of the receiving antenna (below). Therefore we have to accept and minimise transmission line and attendant losses. Merit CCTV packs a 1m length of RG-178 cable fitted with an SMA fitting on one end, type N male on the other end, with each of their YA-2425 Yagi/Yaki antennas. The antenna has a type N (female) connector. Allthings (Australia) offers a trio of SMA (only) connector antennas which would require a separate SMA>N adapter to transition from lower loss transmission line cable. The Merit antenna (YA-2425) claims 13 dBi gain at NZ$120. An equivalent (12 dBi claimed gain) Allthings antenna (Ant-Y12) which includes a smart weatherproof housing is A$119. The SMA fitting is, however, a poor choice.

The receiver

In SF#108 we discussed the general short comings of commercially available 2.4 GHz video (+ audio) receivers. They lack gain and sensitivity, a side effect of being primarily designed for short-range (500m and down) links. Our SF#108 solution, using S-band LNBs, is only good if you can locate the parts. Alternately, both Merit and Allthings offer receivers. What you miss in receiver sensitivity you either make up in transmitter power, receive antenna gain, or a combination of these factors. The transmission line loss, at either end, becomes critical when the receiver is of low quality. This is a subject we'll investigate more fully in a future 2.4 GHz report here in SatFACTS.

By placing 0.1/0.5/1 watt transmitter at antenna and using 1m SMA>N jumper (below), transmission line losses are almost eliminated. However, transmitter must be in weatherproof housing, and, shielded A +V connecting cables to feed audio and video source signals to transmitter must be installed. Plus - 12V DC to power the transmitter is required - a third line to run up the tower/mast, and protect from the weather/moisture. Video and audio lines can be RG6 if properly weather protected although lines in excess of 30m may require additional baseband amplification (V and A "boosting") to compensate for cable losses.

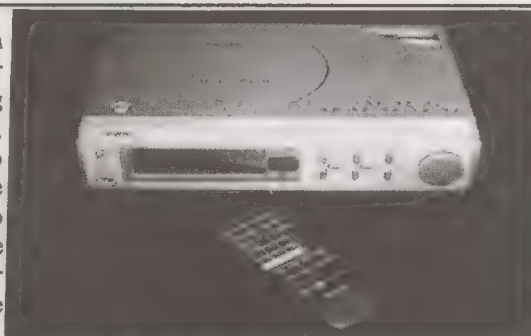
Garry Cratt's energy at work -

Step-by-Step instruction to receive WorldSpace in Eastern Australia

WorldSpace Corporation was founded in 1990 by Noah A. Samara, with a vision to provide digital satellite audio, data and multimedia services primarily to the emerging markets of Africa and Asia. The organisation is headquartered in Washington, and began with the vision of using direct audio broadcasting by satellite to stop the spread of AIDS in Africa. The WorldSpace system can be used as a powerful tool for spreading knowledge, allowing users to become better educated, live a healthier lifestyle and to become more aware of the environment in which they live. To implement this vision, WorldSpace conceived and built the first ever satellite radio infrastructure in the world.

In the past 12 years, the company has built three satellites and launched two, to provide audio, data and multimedia broadcasting coverage to Africa, Asia, The Middle East and Western Europe.

The system comprises a network of geosynchronous satellite with coverage over Africa and the Middle East (AfriStar), Asia-Pacific (AsiaStar) and Latin America (AmeriStar). AfriStar was launched in October 1998, AsiaStar in March 2000. AmeriStar is yet to be launched. The three satellite constellation has a potential audience of 4.6 billion people. The organisation has so far invested 1.2 billion US dollars on the system.

The WorldSpace system technology has been licensed and is being used in the USA by the XM Radio Company for the delivery of radio services in S band across the USA. The WorldSpace satellites are based on a 3 axis stabilised Eurostar 2000 platform which carries 28 metre solar panels capable of supplying the 6kW required by the 2750 kg satellite. The AsiaStar satellite covering our part of the world, was supplied to Alcatel Espace (the WorldSpace prime contractor) by Matra Marconi Space and launched aboard an Ariane V launcher. Signals are uplinked to the satellite on X band (7025-7075MHz) in FDMA mode.

Unlike conventional C or Ku band systems, the WorldSpace satellite system uses the 1467-1492MHz "L" band spectrum, which has been allocated for digital audio broadcasting by the ITU at the World Administrative Radio communication Conference of 1992. Audio and data content is transmitted in encoded 128Kbps MPEG 2.5 layer 3 format. The satellite signal utilises circular polarisation to minimise antenna pointing errors.

Using powerful beams, the two existing satellites transmit three overlapping areas of approximately 14 million square kilometres each. The three beams allow for a mix of continent wide and region specific programming. Each beam can support up to 50 radio programs. It has been said that the use of digitalisation and audio data compression technologies, combined with satellite transmission, is the biggest single breakthrough since the advent of short-wave radio.

Users can purchase a WorldSpace receiver and "PC adapter" to interface receiver to a computer, allowing them to download Internet data, thus expanding the reception capabilities beyond audio, to digital multimedia transmissions. This can be delivered by satellite to audiences located in areas where there is no, or poor Internet access. The WorldSpace receiver is also available as a plug in card, to be internally fitted to a personal computer.

Listeners in the official coverage areas need only flip up the inbuilt 10cm antenna or place the 10cm external antenna on a windowsill to obtain near CD quality reception. For listeners in fringe areas, WorldSpace markets several yagi antennas (which unfortunately we found to be of no use in Australia).

WorldSpace satellites use onboard processing to allow broadcasters and multimedia content providers to chose from two options for uplinking their broadcast signals. One option allows them to uplink their programs via a shared hub, whilst the second option allows for direct uplinking to the satellite using a transmitter, encoder and dish.

The satellite is accessed in FDMA (Frequency Division Multiple Access) mode as this allows maximum flexibility when multiple independent uplink stations are used.

Sanyo WorldSpace receiver; Global coverage patterns of existing WorldSpace satellites (above).

Garry Cratt practically "invented" small dish satellite reception in Australia, dating back to the late 1970s. His Av-comm Pty Ltd. is "the" hardware source for all serious satellite enthusiasts in the Pacific region. cgarry@avcomm.com.au.

Channel	Broadcaster name and program type	Kbps	TDM / Freq / Polarisation
BC1302	World Radio News (WRN)	32	TDM 54 1478 MHz LHCP
BC1126	Ultra Pop (pop)	64	TDM 59 1480 MHz RHCP
BC1127	24 X 7 (International dance)	64	TDM 59 1480 MHz RHCP
BC1128	Potion (Urban adult contemporary)	64	TDM 59 1480 MHz RHCP
BC1129	Up Country (Country music)	64	TDM 59 1480 MHz RHCP
BC1130	Maestro (Classical)	64	TDM 59 1480 MHz RHCP
BC1131	Riff (Jazz)	64	TDM 59 1480 MHz RHCP
BC1132	Ritmo (pop) (English)	64	TDM 59 1480 MHz RHCP
BC1303	CNN International	32	TDM 54 1478 MHz LHCP
BC1133	Radio Voyager (pop)	64	TDM 54 1478 MHz LHCP
BC1304	Bloomberg (News)	32	TDM 54 1478 MHz LHCP
BC1305	Bloomberg Japan (News-in Japanese)	32	TDM 54 1478 MHz LHCP
BC1300	Swiss Radio International (English)	32	TDM 54 1478 MHz LHCP
BC1134	The Hop (encoded)	64	TDM 54 1478 MHz LHCP
BC1135	Orbit Rock (encoded)	64	TDM 54 1478 MHz LHCP
BC1136	Oyeme! (encoded) Spanish music	64	TDM 54 1478 MHz LHCP
BC1125	Bob (modern rock)	64	TDM 59 1480 MHz RHCP
BC1306	CENI (Asian language)	32	TDM 54 1478 MHz LHCP
BC1444	AMI (Christian)	32	TDM 54 1478 MHz LHCP
BC1401	MTV Indonesia (English)	64	TDM 59 1480 MHz RHCP
BC1413	RRI Pro 3 Indonesia (Bahasa)	32	TDM 59 1480 MHz RHCP
BC1414	Trijaya FM (Bahasa)	32	TDM 59 1480 MHz RHCP
BC1416	BBC World Service-Asia East	32	TDM 59 1480 MHz RHCP
BC1417	AIR –All India Radio (Hindi)	64	TDM 59 1480 MHz RHCP
BC1418	KL Radio-(encoded) (Tamil)	64	TDM 59 1480 MHz RHCP
BC1420	Le Jhoom (Hindi)	64	TDM 59 1480 MHz RHCP
BC1214	Farista (Hindi)	64	TDM 59 1478 MHz LHCP
BC1314	Sai Global Harmony	32	TDM 54 1478 MHz LHCP
BC1301	RFI (Radio France International)	32	TDM 54 1478 MHz LHCP

In the studio, the broadcaster multiplexes the audio programs on a Broadcast channel (BC). The uplink station splits the BC into Prime Rate Channels (PRC), each with a capacity of 16kbps for transmission to the satellite. The uplink has the capacity to accommodate up to 288 Prime Rate Channels. The digital processor on board the satellite demultiplexes and demodulates the Prime Rate Channels at baseband, and converts them to TDM (Time Division Multiplexing) for L band transmission of the signal to listeners.

The satellite operates a pair of 150 watt travelling wave tube amplifiers operating in parallel. Within the 25MHz downlink band there are 82 carriers, labelled TDM 1-82. Each beam has two carriers, in the case of the AsiaStar southern beam, these are TDM54 and TDM59. Within each TDM there are 96 Prime Rate Channels of 16 kbps.

As can be seen from the AsiaStar satellite footprint, the signal officially reaches the northern part of Western Australia. However there is sufficient signal spillover to allow reception in most parts of Australia. Reception in Karratha and Perth is possible with a 1.2m dish, and a 2.4m dish in Sydney. Signals have been reported in Palau and Guam. We set out to determine the minimum requirements for a system in Sydney and discovered that the combination of a WorldSpace patch antenna, home-made mounting bracket and a standard 2.3m TVRO dish gave quite good results on the southern beam. We could not receive the west or eastern beams of the satellite.

The patch antenna itself is an active device, powered by the receiver (3 volts) and contains antennas for RHCP and LHCP signals, a switching system and a preamplifier. It is fed with small diameter 75 ohm coaxial cable and terminated with an F type male plug. Extending the feed cable with quad shield RG6/U had no effect on the received signals.

Patch antenna at 2.3m focal point

The dish does not have to be particularly accurate, as the L band signal is quite forgiving of reflector inaccuracies. AsiaStar is located at 105 degrees east longitude, and this equates to a dish azimuth of 298 degrees and an elevation of 27.23 degrees for Sydney.

We used the metal plate supplied with most dishes to cover the hole in the centre of the dish (purely cosmetic), as a mounting platform for the patch antenna. By placing this plate at the focal point (where the scalar rings would normally be mounted in a satellite receiving system), a convenient mounting position is created.

The best method of securing the patch antenna to the plate is to use heavy duty "Velcro" strips. We found that two strips 150mm long provided enough support to hold the feed system in place. Prior to affixing the Velcro strips to the patch antenna, we found it was necessary to remove the swivel backing plate that is supplied with the antenna.

This bracket is intended for use where the patch antenna is mounted on a window sill, and is surplus to requirements in our application. The bracket can be removed using a Philips

The photo (right) shows the internal components of the patch antenna. The metal plate at right houses the two antennas and the amplifier and switching circuitry (underside of plate).

It is also a good idea to waterproof the antenna, and this can be done using bathroom sealant to cover the cable exit hole and those housing the screws securing the two halves of the patch antenna housing.

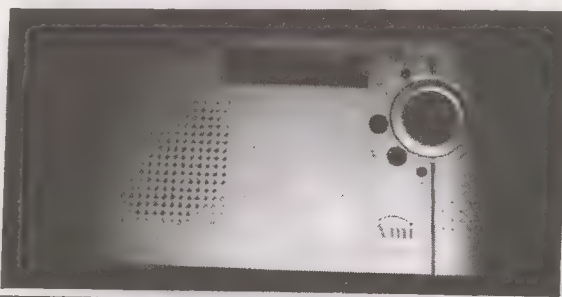
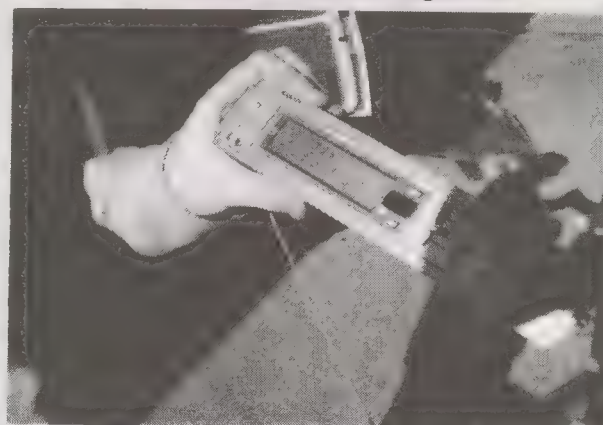
We did try a combination of the WorldSpace LNA and various third party "coffee can" feeds with good results, even though they were designed for GMS weather satellite reception at 1691MHz, some 200MHz away.

Internal parts for WorldSpace "active patch antenna." Some disassembly is required. Below - coffee-can type of helical feed on dish (left) and inside (right).

A program guide can be downloaded from the WorldSpace Internet site (www.worldspace.com). No doubt there will be more channels as the systems gains popularity.

The AsiaStar TCR (tracking, control and ranging) functions are provided by the WorldSpace Regional operations centre (ROC) in Melbourne. This is backed up by a separate TCR centre in Mauritius.

There has been a recent development in future WorldSpace technology with the introduction of a hybrid satellite/terrestrial DBS delivery system concept. This new hybrid system has the ability to extend the reception performance of the digital system to deliver robust mobile reception performance ! The system uses selective combining of digital signals from the satellite, with the same digital signal received and repeated by terrestrial stations of a single frequency network. In fact the terrestrial transmission could take place on existing VHF or UHF bands, leading to the possibility of local traffic information and advertising insertion at the terrestrial transmitter site.

A number of receivers are available (see SF#106, p. 8 for listing and contacts); this shows (below) AMI's Second Generation WorldSpace receiver.

Our Sanyo receiver showing "3 stars" of signal - a handy tool for antenna alignment.

The terrestrial delivery system is based on Multi Carrier Modulation, a multipath resistant Orthogonal Frequency Division Multiplex technique that has gained wide acceptance for high quality terrestrial mobile reception. The MCM system uses multiple frequencies to avoid frequency selective fading and to narrow the receive signal bandwidth to minimise delay spread.

A new second generation WorldSpace receiver will be required, one that demod- ulates both the TDM signals from the satellite and the terrestrial MCM com- ponents. The receiver will be backward compatible with the present satellite service. The system was trialled in South Africa (using AfriStar) in late 2000 with successful results.

What does all this mean for Australia ??

In 1993 the Australian government notified the ITU to reserve an orbital location at 155.5 degrees east longitude for DBSTAR, a satellite to provide DSB services across Australia. This notification was revised in 1999 to provide enhanced coverage beyond Australian into the south west Pacific.

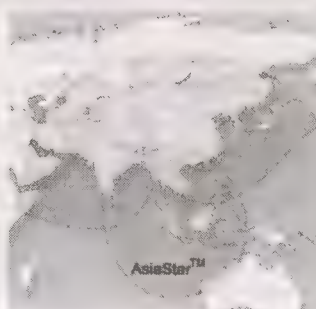
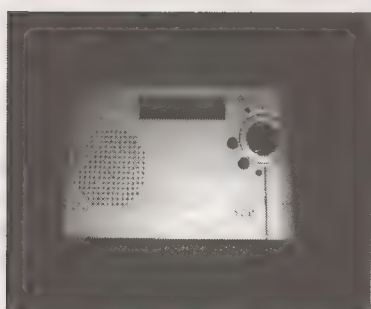
The WorldSpace hybrid DBS system could easily be used to provide Australia with universal coverage of all states and territories. All that is required is government support for the orbital allocation.

21st century shortwave radio
WORLDSPACE IS HERE !!

Even though we are supposed to be out of the official footprint, we have found it is possible to receive the southern beam of Asiastar, carrying the WorldSpace radio service using a 2.3m dish*, special patch antenna and WorldSpace receiver. Now you can receive up to 20 fantastic audio channels in 128 KBit MPEG 2.5 stereo audio by satellite. The satellite is located at 105 degrees east longitude close to Asiasat 3.

Choose from Rock, Jazz, Classical, Pop, Rave, Techno, Rhythm & Blues, Country, Latest Hits and several news channels, including CNNI, BBC, and Bloomberg. There are also international channels catering for European, Chinese, Japanese and Korean listeners, all available free to air !!

You get: a 2.3m mesh 4 panel segmented dish, an official WorldSpace radio receiver with headphone output and inbuilt speaker, special microwave "active patch antenna", 25 metres of coaxial cable, and our comprehensive set up instructions. All this for only $825 including GST.

BE FIRST IN YOUR AREA WITH WORLDSPACE !!

*** 2.3m minimum dish size.**

AV-COMM PTY LTD
ACN 002 174 478
24/9 Powells Road Brookvale NSW 2100
P.O. Box 225 Brookvale NSW 2100
Tel: 02 9939 4377/ 9939 4378
Fax: 02 9939 4376
www.avcomm.com.au
established 1981

TECHNICAL TOPIX

DVB-T DiSEqC Switching - again!

"I am surprised you made the mistake that you have. In my suggestion about powering terrestrial masthead amplifiers with DC rather than AC (SF#107, p. 20), you have added some text to my original letter and from that made an incorrect assumption. The text you added was, "Of course masthead designs would have to change "from AC to DC powered ... ." You seem to have made the assumption that because masthead amplifiers have a power supply specification of 22 V AC that they cannot be powered by DC. That is the wrong assumption.

"If you inspect the circuit-board in a masthead amplifier, the power supply is very basic. An inductor, to prevent the RF from entering the power-supply circuit; a diode to half-wave rectify the AC, a couple of resistors to form a voltage divider and finally an electrolytic capacitor to smooth the half-wave rectified DC.

"This simple circuit can be either AC or DC powered. Granted, there might be a problem with some brands of masthead amplifiers, if the designer chose to power their amplifiers from the negative half cycle of the AC supply. That would make the 'common' rail on the circuit board positive. And as the common rail is connected to the shield on the coaxial cable (downline to the remote power supply and receiver), that would mean that if you wished to power such an amplifier from DC, the polarity would need to be the reversal of the normal.

"I know from experience that (the) Kingray brand amplifiers are designed to be powered by the positive half cycle of AC; thus they will also run on the DC with the shield of the coax being negative. Some mastheads have links to change the resistors in the voltage divider so they can be powered by DC voltage as low as 12 volts (for Caravans and other DC areas). I am not familiar with the universe of masthead amplifiers beyond Kingray but believe it quite probable most will run quite happily on 18V DC. Yes, there might be slightly reduced (amplifier) gain (if the masthead was originally designed to run on 22 V AC rms), but the change of just one resistor in the voltage divider in the voltage divider should bring it back to full gain. And in the case of DVB-T, where masthead amplifier overload might be created with too much gain, this reduction in gain could possibly be an advantage. Thus, many masthead amplifiers will work well on 18V DC with no modifications whatsoever!"

IF, Queensland

Toroidal in NZ?

"I am wondering whether the 90cm Toroidal antenna (autosat@accsoft.com.au) has a useful function here in New Zealand. Many folks have added dish systems for BVN (for example - there being many Dutch immigrants here) through C1's Globecast (156E) whereas we already have B1's Sky Network TV and TVNZ's FTA TVOne and TV2 from B1 (160E). Two dishes seem like a stupid way to deal with this challenge. What do you think?"

A.J. Kinsey, Wellington

We agree. There is one more element to the equation which perhaps New Zealanders have not yet considered; B3 now moved to 152E. The present Ku world into NZ has only two satellites with desirable programming on both. But as C1 is now activated at 156, and B3 which has a few years of useful life remaining is now at 152, there are other chances for new programming from the relocated B3 satellite. Foremost amongst these could be Impact TV, the NZ based firm which announced intentions in December to provide a combination of FTA and CA services (the latter to be Irdeto Euro-I, version 2). Just how the FTA package will be put together remains their closely guarded "secret" for the moment, but as it would include New Zealand's TVOne, TV2, TV3, TV4 and Prime (their statement - not our supposition) and these services have copyright constraints which would be a "problem" if the programming was available in say Australia, Cardview (similar to Aurora cards) will be employed as well.

The programming aspects aside, the technical side bares some investigation by New Zealand installers. A Toroidal antenna is a specially shaped offset fed design which allows two or more separate LNBF's to be positioned so that each is boresighted on a single satellite; for example, going east to west, B1/C1/B3. With a suitable DiSEqC equipped receiver, individual LNBF's are selected by the receiver's software and remote so that "switching" between satellites is as painless as pushing the appropriate RCU button. Several SatFACTS readers in Australia have Toroidal antennas; David Mitchell in NSW has seven separate LNBF's on his 90cm which covers from I701 (180E) to Measat (148.5E); just like having (in his case) six separate antennas all full-time pointed at six different satellites.

This technology has been well tested and refined in Europe where (as Roy Carman explains on p. 10, SF#108) the "full sky" includes hundreds and hundreds of (FTA) services from nearly a dozen separate satellites.

Some caveats. A Toroidal has less gain on any individual satellite than a dedicated offset of the same physical dimensions (a 90cm Toroidal may be the equivalent of a 65cm offset, for example, on each individual satellite). That simply means you select a Toroidal "size" based upon the weakest satellite you intend to receive, not unlike the same mental exercise with an offset antenna. Each LNBF stands alone, is for one satellite only, and is positioned on the "mounting ring" at a location where that particular satellite "peaks up" with best signal level. For a technical analysis of the Toroidal antenna, see p. 22, here.

Connectors?

"The SMA fittings commonly found on 2.4 GHz receivers and transmitters are difficult to deal with; any suggestions?"

AI, Victoria

Assuming you are going to use larger size coaxial cable (to reduce cable losses), what makes the most sense is "Type N," a fitting good through 5 GHz if properly installed. What you need is Type N to SMA with male SMA and either female or male Type N as suits your situation. Allthings (www.allthings.com.au) has catalogue SMAm-Nf SMA male to N female, and, catalogue # SMAm-Nm for SMA male to type N male. Kluging connectors on a workbench is not advised - even these professional connectors can cost you a dB in through loss at 2.4 GHz!

Toroidal?

"There is a firm in NSW selling a Ku band antenna approximately one metre in size which uses a substantial subreflector and a complex mounting arrangement which apparently will hold individual LNBs for as many as 6 different satellites spread at least from I701 (180E) to Optus B3 (152E). Is this a joke or a serious antenna?"

Archie Taylor, NSW

The Toroidal (model) 90 antenna is significantly different in concept from similar appearing "offset" antennas which typically work with a single satellite at a time (requiring repointing for reception from a second, third satellite). It is supplied by Autosat Australia P/L (51 Cosgrove Road, Stratfield South; 61-2-9642-0266).

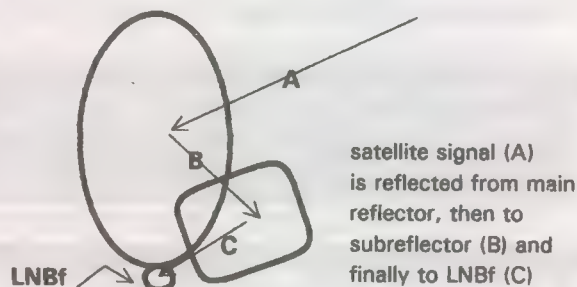
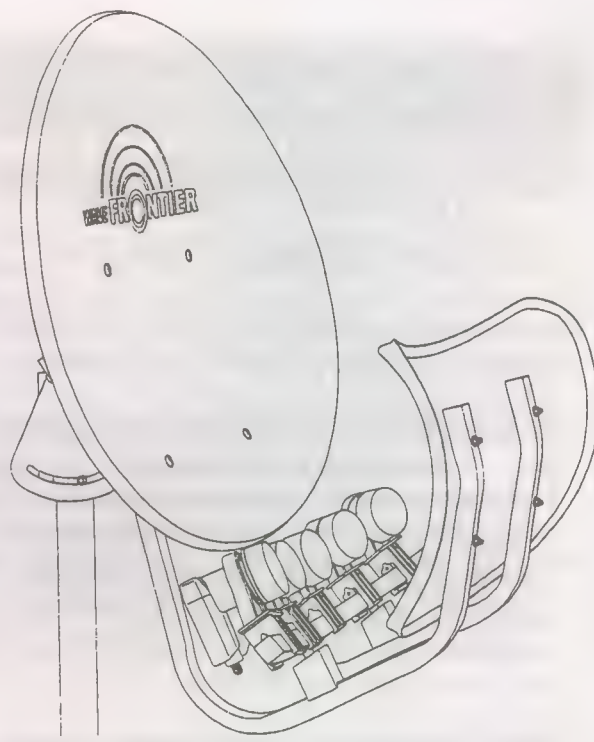
The theory behind it is in two major stages. The primary reflector measures 96.7cm in height by 108.6cm width in a teardrop shape not distinctly different from standard offset antennas. However, like many offset designs, it has a "shape" which is somewhat unique to its "special purpose" (with apologies to Steve Martin).

In a normal offset antenna, the dish is positioned "low" of the direct line of sight path to the satellite (i.e., it does not centre-point at the satellite such as a prime focus parabolic dish). To compensate for this low-look position, in conjunction with the "spherical" shape, the LNBf (feed) is located low down on the dish, actually below the point where it will block or otherwise shadow/shade any portion of the dish proper for the high angle arriving signals. A prime focus antenna has the centre of the dish plus the feed directly in line with one another and the satellite above the equator.

But the Toroidal does not place the LNBf out front, low, pointing back at the reflector surface. Rather, as the diagram (upper right) illustrates, where the normal offset feed should go we have a second (sub) reflector. In the T-90, this reflector sits down low, out of the way of the incoming higher angle satellite signal and measures 36.1 cm high x 83.6 cm in width (77% of the width of the main reflector at its widest point). As the second diagram (to right) depicts, the incoming wave is reflected first from the larger main reflector, then from the smaller subreflector and finally to one quite tiny "spot" geometrically located down even lower and almost under (below) the lower lip of the main reflector. Each satellite has its own unique mounting spot for the LNBf.

In geometry, a "Torus" is a ring of a circular cross section. The designers of this antenna probably had a good grasp of spherical geometry and the unique "focusing qualities" of a Torus-Ring but they are stretching a bit by naming the antenna "Toroidal" (which is actually an adjective, not a noun, and means, "of or resembling a torus").

That nit-picking aside, a main reflector 96.7cm high x 108.6cm maximum width refocusing to a subreflector 36.1cm high x 83.6cm wide has the gain of a "standard' offset reflector in the region of 65-70cm (39 - 40 dB if everything is spot-on adjusted). In most installations, using 152E as one "end" of the satellite arc and 180E as the opposite end of the arc, we have a geometric swath of 28 degrees. If the dish is adjusted so that the centre (0 degrees azimuth - where the centre of the dish points) is half of 28 degrees, the antenna's centre will be pointing (after adjustment) at 152 + 14 or 166E. Toroidal instructions suggest that the gain of the system will be maximum (40.1 dB) at that point and will gradually taper off towards 152 and

satellite signal (A) is reflected from main reflector, then to subreflector (B) and finally to LNBf (C)

180 such that each will be around 39.5 dB. The maximum arc the creators claim is +/- 25 degrees (if centred at 155, from 130E to 180E).

The most important feature of the antenna is that because of the main + subreflector system, the antenna is similar to a telescope with double image reflection. The incoming waves striking the main reflector are second-time-focused by the shape of the subreflector which has the effect of making the focus point down at the LNB mounting area even more tightly defined. The 108.6cm main reflector and 83.6cm subreflector widths are not by accident; they have been carefully calculated, along with the shape of each reflector, to provide a capability for as many as 8 separate LNBfs to be installed on the "arm" visible in the diagram above-top. If you divide 50 degrees of azimuth coverage by 8 locations, you end up with 7.14 degrees of "sky" between each LNBfs' physical location (#s 1 and 8 being at opposite ends of the LNBf mounting bar leaving 7 spaces). But with satellites only 4 degrees apart (152/B3, 156/C1, 160/B1) the antenna's LNBf mounting rod/stick gets really clever (this is the "Torus hole effect") by being in the shape of an "arc" which is compensated for by the reverse arc (convex) on the subreflector. Net result? Enough physical room for 8 LNBfs (the main reflector is concave, the sub is convex and the LNBf arc is also concave). The manufacturer is WaveFrontier in Korea (www.wavefrontier.com). And it sure beats installing 65-70cm times 8!

SatFACTS Pacific/Asian MPEG-2 Digital Watch: 15 September 2003

Bird	Service	RF/IF &Polarity	# Program Channels	FEC	Msym	Receivers and Errata
Thcm3/78.5	SkyChAust	3695/1455H	up to 3	3/4	5(.000)	CA (#1, 3); FTA audio #2 (dm)
	Indiavision	3685/1465H	1	3/4	6(830)	Tests June 2003; not permanent
	MRTV-Myn	3676/1474H	1	2/3	6(.000)	erratic service
	Korean Central	3665/1485H	1	2/3	3(.367)	Global footprint; changes 02/03.
	TARBS ME mux	3640/1510H	12TV, 12 radio	3/4	28(.066)	CA + 2 FTA(A1TV, IRB3)(DM)
	Ch Nepal	3626/1524V	1	3/4	15(.556)	New 03/03; FTA
	Mahar mux	3600/1550H	11TV, 1 rad	3/4	26(.667)	Thai + Indian services; FTA (DM)
	SE asia Mux	3569/1581H	2+ TV	3/4	12(500)	MRTV3, MRTV (DM)
	RR Sat mux	3551/1600H	8TV,10 radio	3/4	13(333)	3TV, 5radio currently in use (DM)
	JAIN TV	3538/1612V	1TV	3/4	3(300)	PIDs 4132/4133
	PTV1 +	3521/1629V	1TV, 1 radio	3/4	3(333)	frequency change
	TARBS	3520/1630H	12TV, 12 radio	3/4	28(066)	Feeds to TARBS Australia and PAS-8 (DM)
	TVK Cambodia	3448/1702H	1TV	1/2	6(312)	FTA
	TARBS/Th5	3480/1670H	12 TV+radio	2/3	26(667)	**3FTA**: TV5, VTV4, ATN Bangla (DM)
	KCTV/Korea	3424/1726H	1TV	3/4	3(366)	Not 24 hour
	Thai Global	3425/1725V	up to 7?	2/3	27(500)	FTA (reaches SE Australia)
InSat 2E/83	ETV mux	4005/1145V	6+ TV	3/4	27(000)	Several ETV now here; wide beam
	Hyd Dig 2E	3910/1240V	1	3/4	5(000)	SCPC, OK E Aust. wide beam
	Kairali TV	3699/1451V	1	3/4	3(.184)	SCPC, OK E. Aust wide beam
	Indian mux	3643/1507V	3	3/4	19(531)	corrections 12/02
	ETV Mux#2	3485//1665V	4+TV	3/4	27(000)	Several new ETV here; Asia beam
	Sky Bangla	3430/1720V	1TV	3/4	6(.000)	New - November 2002
ST1/88E	MMBN	3632/1518V	12TV	3/4	26(667)	Nagravision, some FTA; erratic
NSS6/96E	New MUX	12.729V	? + TV	7/8	27(.500)	Close to horizon; LNBf skews towards Hz!
	Test MUX	12.688V	? + TV	3/4	28(066)	PowerVu; may be NE Asia beam; tests
	Test MUX	11.592H	? + TV	7/8	26(.000)	TARBS was testing here - uplifted from Thaicom
As2/100.5E	Shandong TV	4070/1080H	1TV	3/4	6(.811)	New - October 2002
	Euro Bouqt	4000/1150H	6TV, 21r	3/4	28(125)	FTA TV + radio
	Sichuan TV	3946/1204H	1TV + radio	3/4	4(420)	New April 2003
	Reuters News	3905/1245H	1TV	3/4	4(000)	Was 3923H; sometimes **FTA**
	WorldNet	3880/1270H	4+/28radio	1/2	20(400)	FTA; multiple audio services
	Hubei/HBT	3854/1296H	1	3/4	4(.418)	FTA SCPC, teletext, 2 radio
	Hunan/SRT	3847/1303H	1	3/4	4(418)	FTA SCPC, teletext
	Guan./GDT	3840/1310H	1	3/4	4(.418)	FTA SCPC, radio APID 81
	In. Mongolia	3828/1322H	2	3/4	8(.397)	FTA: #1 Mongolian, #2 Mandarin
	APTN Asia	3799/1351H	1	3/4	5(632)	Sometimes **FTA**; also 3895Vt
	Reuters/Sing	3775/1375H	1	3/4	5(631)	**FTA** & CA
	Liaonin/Svc2	3734/1416H	1	3/4	4(.418)	FTA SCPC, radio APID 256
	Jiangx/JXT	3727/1423H	1	3/4	4(.418)	FTA SCPC, teletext, radio APID 81
	Fujian/SET	3720/1430H	1	3/4	4(418)	FTA SCPC, + radio APID 80
	QinghaiTV	3713/1437H	1	3/4	4(.418)	FTA SCPC, + 2radio (APID 80)
	Henan/Main	3706/1444H	1	3/4	4(418)	FTA SCPC, + radio
	Egypt/Nilesat	3640/1510H	7+, radio	3/4	27(850)	Thru TARBS Aust, occ. **FTA**
As2/100.5E	Macau MUX	4148/1002V	5TV	3/4	11(850)	5 chs TV, FTA, some tests
	Feeds	4086/1064V	1	3/4	5(632)	FTA SCPC feeds
	Dubai MUX	4020/11430V	4+, radio	3/4	27(.500)	FTA including sport
	Jilin Sat TV	3875/1275V	1	3/4	4(418)	FTA SCPC, + radio
	Shanghai BN	3846/1304V	1	3/4	4(800)	V1110, A1211 + 2 radio ; FTA Jan 2003
	HeiLongJian	3834/1316V	1	3/4	4(418)	FTA SCPC
	JSTV	3827/1323V	1	3/4	4(.418)	FTA SCPC, + radio
	Anhui TV	3820/1330V	1	3/4	4(418)	FTA SCPC + radio
	ShaanxiQQ	3813/1337V	1	3/4	4(418)	FTA SCPC, radio APID 81
	Guan/GXTV	3806/1344V	1	3/4	4(418)	FTA SCPC, radio APID 257
	Fashion TV	3795/1355V	1	3/4	2(626)	FTA as of May 01, 2003
	Myawady	3766/1384V	1	7/8	5(.080)	FTA SCPC - difficult to load
	Saudi TV1	3660/1490V	7+/tests	3/4	27(.500)	FTA MCPC; Yemen, MBC Europe tests
As3S/105.5E	Telstra I-Net	12.596V	no TV	5/6	30(000)	Signal useful for dish testing - no TV
	Zee bouquet	3700/1450V	10TV	3/4	27(500)	Mediaguard (SECA) CA; 2 have been FTA
	Ch News Asia	3706/1444H	1TV (+)	3/4	6(.000)	New September 2003; English + V1160, A1120
	Arirang TV	3755/1395V	1	7/8	4(.418)	FTA SCPC; New PIDs V3601, A3606 June 2003
	Now TV +	3760/1390H	up to 8TV	7/8	26(000)	CA + NOW, B'berg, Indus, MTA FTA
	Star TV	3780/1370V	7(+)TV	3/4	28(.100)	NDS CA (Pace DVS211, Zenith)
	Star TV	3840/1310H	7(+) TV	3/4	27(500)	Star News India (Eng) **FTA**; V514, A648
	Star TV	3860/1290V	5(+)TV	3/4	27(500)	NDS CA (Pace DVS211, Zenith)
	Star TV	3880/1270H	20(+)TV	7/8	26(850)	NDS CA (Pace DV211, Zenith) in transition 06-2003
	Star TV	3920/1230H	4+ TV	7/8	26(.850)	Star Sports Asia (+), **FTA** NTSC; V512, A640 English
	Star TV	3940/1210V	6(+)TV	7/8	26(.850)	NDS CA as above
	CNNI	3960/1190H	8(+)TV	3/4	27(500)	PowVu CA; new SR Apr 29
	StarTV	3980/1170V	6+TV	3/4	28(.100)	NDS CA (Pace DVS211, Zenith)
	Star TV	4000/1150H	8(+)TV	7/8	26(850)	NDS CA w/ **4(Chinese) FTA**
	Sahara digital	4020/1130V	8TV	3/4	27(.500)	New Sr; Dubai MUX
	Pakistani TV	4090/1060V	1+TV, radio	3/4	6(.666)	New to digital June 2003; V308, A256
	Sun TV	4095/1055H	1	3/4	5(554)	"History Channel" testing SCPC
	TVB Mux	4010/1040H	3	3/4	11(.230)	**MATV Chinese movies FTA**; + CA
	CCTV bqt	4129/1021H	4(+) TV	3/4	13(.240)	moved from 4115
	Zee Bqt #2	4140/1010V	8(+) TV	3/4	27(500)	Mediaguard (SECA) CA
Cak1/107.5	Indovision (S-band)	2.535, 2.565, 2 595, 2.625, 2655	33(+) TV	7/8	20(.000)	NDS CA using RCA/Thomson, Pace IRDs; **2.535 has 2 FTA**
T'Kom/108E	IndoBqt	3460/1690H	up to 6	3/4	28(.000)	also 3586H/17.500, 3496H/19.615
C2M/113E	TPI	4185/965V	1	3/4	6(.700)	FTA SCPA; NT/NC only
	TVE Asia-Africa	4160/990H	1	3/4	5(.632)	New August 2003
	Anteve	4144/1006V	1	3/4	6(510)	change from 4055V; FTA SCPC
	Indo Mux	4080/1070H	5+ TV	7/8	28(125)	Global TV - erratic new FEC 06/03
	Indostar	4074/1076V	1	3/4	6(.500)	FTA (new 06-03); V2201, A2202
	SCTV	4048/1102V	1	3/4	6(.618)	FTA SCPC; NT, New Caledonia only
	Indonesian Mux	4000/1250H	6+ TV	3/4	26(085)	undtable platform - not always there
	Satelindo	3935/1215H	1	3/4	6(.700)	test card - only - reported
	Bali TV	3926/1224H	1	3/4	4(.208)	FTA, may not be active

Bird	Service	RF/IF & Polarity	# Program Channels	FEC	Msym	Receivers and Errata
	Indo. MUX	3880/1270H	3+ TV	7/8	28(.121)	FTA; Sr change 01/03 erratic
	GlobalMUX	3760/1390H	up to 11 TV?	7/8	28(.121)	test cards (11), new Sr/FEC 01-03
	Brunei/Sing	3733/1417H	1TV	3/4	6(.000)	FTA share time; Brunei 23 hrs, Sing 1 hr
	TBN/Trinity	3727/1423H	1 TV	3/4	3(.000)	New PIDs 02/03; V177, A180
	Unknown	3605/1545H	1TV	3/4	2(.900)	multiscreen; may have no video
	RCTI	3473/1677H	2	3/4	8(.000)	FTA SCPC; Australia, New Caledonia, some English
	Myawad TV	3706/1444H	1	3/4	5(.924)	Tests; may be arratic if even operating
As4/122E	Speedcast data	4120/1030H	0 - data only	3/4	27(.500)	3 data chs, useful for dish tracking
Jc3/128	Miracle Net	3996/1154V	3 up to 6	5/6	22(.000)	PowerVu; some FTA (Ch. 1 & 3)
	Asian bqt	3960/1190V	up to 8	7/8	30(.000)	CA & **FTA** NTSC: Japan, Taiwan
Jc2A 154	Ckynet	3880/1270V	up to 12	3/4	30(.000)	Cnet (Taiwan) tests; not full time
	BYU tests	3.915/1245V	2	3/4	3(.703)	Erratic service; very strong NZ and Australia
MeaSs2	New Mux	12.532H	17	3/4	41(.500)	New Sept 2002; unknown source
	Astro Mux	11.602H	up to 17TV	3/4	41(.500)	Aust East beam - **3 FTA** + 14 CA
	VTV MUX	11.522V	3 TV	3/4	9(766)	WA only? Skew path, intended Asia
B3/152	BTV tests	12.407V	6+ TV	2/3	30(.000)	repeat of C1 12.407V
C1/156	Globecast	12.367V/T2	13TV, 12radio	2/3	30(.000)	Aust, NZ 90 cm; 6 TV FTA
	Aurora	12.407V/T3	13TV, 12 radio	2/3	30(.000)	Aust, NZ 90 cm
	Aurora	12.527V/T6	11TV, 19 radio	3/4	30(.000)	Australia NA only (leakage to Norfolk, New Cal)
	Aurora	12.567/T7	2+ radio (only)	2/3	30(.000)	Aust, NZ 90 cm
	Foxtel???	12.607V/T8	Clone of 12.518H	3/4	**27(.800)**	Note change in Sr, NDS tests coming here?
	Aurora	12.720V/T10	10TV, 19 radio	3/4	30(.000)	Australia NA only (leakage to Norfolk, New Cal)
	Austar	12.278H/T11	31 data (some TV)	3/4	29(.473)	CA, subscription available Australia
	Austar/Foxtl	12.398H/T13	11 data, 11TV, 1 r	3/4	29(.473)	CA, subscription available Australia, Norfolk
	Austar/Foxtl	12.438H/T14	12TV	3/4	29(.473)	CA, subscription available Australia, Norfolk
	Austar/Foxtl	12.518H/T16	11TV, 8 fill, 1 radio	3/4	29(.473)	CA, subscription available Australia, Norfolk
	Austar/Foxtl	12.558H/T17	11TV, 124 radio	3/4	29(.473)	CA, subscription available Australia, Norfolk
	Austar/Foxtl	12.598HH/T17	11TV	3/4	29(.473)	CA, subscription available Australia, Norfolk
	Austar/Foxtel	12.688H/T20	12TV	3/4	29(.473)	CA, subscription available Australia, Norfolk
B1/160	**ABC NT fd**	12.258V	1TV, 3 radio	3/4	5(.026)	V832, A833; occ. power drops -10 dB
	Occ. feeeds	12.380H	1 TV - *	3/4	6(.111)	* - plus 12.451H, 12.460H
	Occ. feeds	12.384V	1 TV - *	3/4	6(.111)	* - plus 12.293V, 12.402V, 12.411V
	Net 7 service	12.397H	1	3/4	7(.200)	Full schedule less commercials - links
	Central 7	12.354H	1TV + 1 radio	3/4	3(.688)	V1280, A1281; occ. 2nd channel
	Imparja mx	12.379H	2TV + 8 radio	3/4	5(.424)	PIDs vary; also try 12.360, 12.370
	7 digital feeds	12.397H	1TV	3/4	7(.200)	occ. digital feeds; typ fta
	Feeds to NZ	12.411V	1 TV	3/4	6(.111)	Often NTSC; USA-Australia-NZ
	Sport feeds	12.420V	1	3/4	6(.110)	Weekend footy feeds reported-FTA
	SBS Mux	12.420H	3+ TV, 2+ radio	5/6	12(.600)	Also 12.420H same params; SBS HDTV + w-s
	TVNZ DTH	12.456V	5+TV	3/4	22(.500)	FTA 4 channels (TVNZ x 4); + **RWC** will be here
	Nine Net	12.512H	1 TV typ.	3/4	5(.632)	testing digital feeds; Sr may vary
	Sky NZ	12.519/546V	7TV/7TV	3/4	22(.500)	NDS CA, subscription available NZ
	Sky NZ	12.581/608V	6TV/6TV	3/4	22(.500)	NDS CA, subscription available NZ
	Sky NZ	12.644/671V	9TV	3/4	22(.500)	NDS CA, subscription available NZ
	ABC HDTV	12.603H	5TV	7/8	14(.300)	also 12..626,.643,.670, 688, & 706H
	Sky NZ	12.707/733V	8+1V	3/4	22(.500)	NDS CA, subscriptions available NZ
	Mix 106 3	12.574H	1 radio	3/4	1(.851)	Radio SCPC
P8/166	TARBS3	12.326H	13TV + radio	3/4	28(.066)	TPG/EurodecMDS CA, occ. FTA
	TARBS	12.526H	13TV + radio	3/4	28(.066)	TPG /Eurodec MDSCA, **radio FTA**
	TARBS2	12.606H	13TV + radio	3/4	28(.066)	TPG/Eurodec MDS CA; **TRT FTA**
	TARBS5	12.646H	testing	3/4	28(.066)	TPG/Eurodec MDS CA
	TARBS4	12.726H	13TV + radio	3/4	28(.066)	TPG/Eurdec MDS CA; **Thai TV, FTA**
	JEDI/TVB	12.686H	11+ TV	3/4	28(.126)	June 2002-Irdeto-2 CA
	ABC A-P	4180/970H	2TV, 2 radio	3/4	27(.500)	Dateline west, east PAS2, 3901
	Disney Pac	4140/1010H	typ 6 TV	5/6	28(.125)	PowVu CA
	NHK Joho	4060/1090H	7TV, 1 radio	3/4	26(.470)	PowVu CA & **FTA**; subscription available
	FOX MUx	4040/1110V	up to 5TV	7/8	26(.470)	was PAS-2, previously 3992Vt
	NET +	4121/1029V	1 TV	3/4	4(774)	NET25 + FTA; new PIDS April; reload
	ESPN USA	4020/1130H	8+TV, data	3/4	26(.470)	PowVu CA; ch 11 DCP-CCP bootload; new FEC
	Discovery	3980/1170H	8 typ.	3/4	27(.690)	PowVu/CA (some audio **FTA**)
	CalBqt/Pas8	3940/1210H	up to 3+ FTA	7/8	27(.690)	PowVu CA & **FTA (EWTN +)**
	CNBC HK	3900/1250H	up to 7TV	3/4	27(.500)	FTA at this time
	FilipinoMUX	3880/1270V	up to 8TV+radio	5/6	28(.694)	**Myx FTA** V1960, A1920 + radio FTA
	TaiwanBqt	3860/1290H	12TV + 30 r	5/6	28(.000)	Mixed **FTA** & CA; Taiwan Hallmark, STC
	CCTV Mux	3829/1321H	up to 4	3/4	13(.240)	PowVu FTA, replaces PAS-2 svc
	TVBS-N	3836/1314V	**1FTA**, 4+ CA	3/4	22(.000)	Difficult because of CCTV cross pole
	EMTV PNG	3808/1342V	1 + 2 radio	3/4	5(.632)	was As2; PowVu CA
	CNNI	3780/1370H	3, up to 5 TV	3/4	25(.000)	PowerVu
	Discovery Asia	3769/1381V	Upto 5 TV	3/4	13(.240)	PowerVu; Asian MUX
	MTV	3740/1410H	8	2/3	27(.500)	**# 8 MTV China FTA (V0385, A0386)**; rest CA
P2/169E	Off-shore rigs	12.281V	2+ TV, radio	2/3	27(.500)	PowVu CA, WIN, ABC NT
	WA PowVu	12.637(.5)V	4TV, 8 radio	1/2	18(.500)	PowVu CA, WA only - D9234
	NBN-TV	4126/1024V	1TV	3/4	3(.075)	3m up (NZ), 1.8m up Australia
	TARBS	40871063V	9TV + radio	3/4	21(.000)	Occ FTA (Syria, Al-Manar) TARBS input links
	Feeds	4037/1113H	1+ TV	2/3	6(.620)	Sporting feeds (occassional)
	Feeds	4027/1123H	1+TV	2/3	6(.620)	Sporting feeds from USA (occassional)
	Feeds	4023/1127V	1 +TV	3/4	13(.328)	feeds to (USA) pay-TV
	Feeds	3966/1184V	1	2/3	6(.620)	PowVu (FTA) occ feeds
	Feeds	3957/1193V	1	2/3	6(.620)	PowVu (FTA) occ. feeds
	Feeds	3929/1221V	1	3/4	10(.850)	PowVu (FTA) occ sport feeds
	Feeds	3912/1238V	1	2/3	6(.620)	PowVu(FTA) occ. feeds
	Feeds	3898/1252V	1	2/3	12(.000)	PowVu (FTA) occ. feeds
	Middle East	3836/1314V	4 typ	3/4	13(.331)	**02/03: Now ALL Irdeto 2 CA**
	Feeds	3803/1347V	1	3/4	6(.000)	PowVu (FTA) occ sport feeds
	PAS/BBC mux	3744/1406V	3	3/4	21(.500)	**BBC, test card FTA**, others nominally CA

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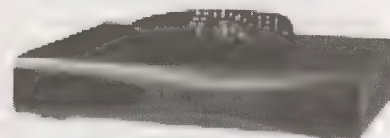
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Bird	Service	RF/IF & Polarity	# Program Channels	FEC	Msym	Receivers and Errata
(PA2/169E)	**Feeds**	4040/1010H	1	3/4	10(.850)	PowVu occ FTA feeds
	7thDayAdv.	3872/1278H	1	3/4	6(.620)	Sat, Sun 0030, 0900+UTC?)
	Feeds	3868/1182H	1	2/3	6(.620)	FTA (occ sport); also try 3863,Sr6.100
	Feeds	3939/1211H	2 (typ NTSC)	2/3	6(.620)/7(.498)	FTA-typ NTSC-occ sport, live Shuttle
	Cal PowVu	3901/1249H	up to 8	3/4	30(.800)	PowVu CA + **FTA** (BBC gone)
	HK bouquet	3850/1300H	up to 8	2/3	24(900)	**was 4148Vt; some FTA**
	occ feeds	3776/1374H	1 typ	3/4	5(.560)	occ feeds, typ FTA, also Sr 5.600
	Korean Bqt	3771/1379H	1	3/4	9(.041)	Korean MUX, reload 02/03
I804/176E	**IPSTAR**	12 619H	1	2/3	25(.220)	Tests, late May start; also 12.646H
	Tests-NZ beam	12.646H	1	3/4	22(.418)	Testing possible data links; June 2003
	RFO Poly	4027/1123R	1TV	3/4	4(566)	SE spot beam; was 4027LHC
I701/180E	TNTV	11.060&11 514	9	3/4	30(000)	east spot, 10TV + r each, vertical pol.
	Canal+Sat	11.610H	16TV, 1 radio	3/4	30(.000)	1+ **FTA**, MediaGd "2"; + 10.975 weaker
	TVNZ	4195/955RHC	1	3/4	5(.632)	DMV/NTL early vers., occ feds, typ ca
	TVNZ/BBC	4186/964RHC	1	3/4	5(.632)	DMV/NTL early vers. occ feds, typ ca
	TVNZ	4178/972RHC	1	3/4	5(.632)	DMV/NTL early vers., occ feds, typ ca
	AFRTS DTS	4175/975L	3 TV, 3 radio	2/3	3(680)	'DTS' **radio, TV audio FTA** some IRDs
	TVNZ/Aptn	4170/980RHC	1	3/4	5(632)	DMV/NTL early vers occ feds, typ ca
	TVNZ/feeds	4161/989RHC	1	3/4	5(.632)	DMV/NTL early vers., occ feds, typ ca
	RFO-Canal+	4086/1064L	4TV, radio	5/6	12(.041))	east hemi 20.5 dBw +; new Sr
	TVNZ/feeds	4052/1098RHC	1	3/4	5(632)	DMV/NTL early vers ,occ feeds, typ ca
	TVNZ feeds	4044/1106R	1	3/4	5(.632)	SCPC, mixed CA and **FTA** feeds
	NZ Prime TV	4024/1126L	1	2/3	6(.876)	PowVu CA; Auckland net feeds
	NBC to 7 Oz	3960/1190R	1	7/8	6(447)	CA, Leitch encoded
	WorldNet	3886/1264R	1TV, 37 radio	3/4	25(.000)	New Feb 2002; very strong NZ, Pacific
	Ioarana	3772/1378L	1	3/4	4(.566)	FTA SCPC; East Hemi Beam-Tahiti
	TVNZ	3846/1304R	1	3/4	5(.632)	SCPC, mixed CA & FTA, feeds
	10 Australia	37691381R	4	7/8	20(.000)	PowVu CA & **TBN-JCTV FTA**
	USA feeds	3749/1401R	4?	?	26(400)	16-QAM (not MPEG-2 compatible)

MPEG-2 DVB Receivers: (Data here believed accurate; we assume no responsibility for correctness!

Aston Simba 201. Embedded SECA (Zee, Canal +); review SF#97. MediaStar 61-2-9618-5777.

AV-COMM R3100. FTA, excellent sensitivity (review SF May 1998); new version Sept. '99. Av-COMM P/L, 61-2-9939-4377.

AV-COMM R3100(A). FTA, good sensitivity, ease of use exc (review SF May 2002). See above contact.

Benjamin DB6600-CI. FTA, Foxtel/Austar w/CAM+card. Autosat Pty Ltd 61-2-9642-0266 (review SF#72)

Coship 3188C. Review SF#107. Blind search FTA rcvr. Possibly available from Satlink NZ www.satlinknz.co.nz. Buy with caution.

eMTech eM-100B (FTA), eM-200B (FTA + CIx2), eM210B (FTA + 2xCI + positioner); KanSat 61-7-5484 6246 (review SF#89)

Humax F1-CI. Primarily sold for TRT(Australia), does (limited) PowerVu (not Optus Aurora approved).

Humax ICRI 5400 (Z). Embedded Irdeto + 2 CAM slots; initial units had NTSC glitch, now fixed. Widely available, SF#76.

Humax IRCI 5410 (Z). Adaptable version capable of holding multi-CA systems (SF#98, 99). Widely available.

Hyundai-TV/COM. HSS100B/G (Pacific), HSS-100C (China) FTA. Different software versions; 2.26/2.27 good performers, 3.11 and those with Nokia tuners also good; later 5.0 not good. SATECH (V2.26)

Hyundai HSS700. FTA, PowerVu, SCPC/MCPC. Review SF March 1999. Kristal Electronics, 61-7-4788-8902.

Hyundai HSS800CI. FTA, Irdeto (with CAM) + other CA systems, PowerVu, NTSC. Kristal Electronics, above; review SF#63.

ID Digital CI-24 Sensor. New August 2003; new lower noise tuner, extra sensitivity; CI Interface slot Irdeto 1 & 2; review SF#109. Sciteq 61-8-9409-6677.

MediaStar D7. FTA, preloaded w/ known services, exc. software (review SF July 1998). MediaStar Comm. 61-2-9618-5777

MediaStar D7.5. New (May 00) single chip FTA; review June 00 SF. MediaStar Comm. Int. 61-2-9618-5777

MediaStar D10. FTA and Irdeto embedded CA. VG receiver; see review SF#96, August 2002. Contacts immediately above.

MultiChoice (UEC) 660. Essentially same as Australian 660, not grey market contrary to reports. Sciteq tel 61-8-9306-3738

Nokia "d-box" (V1.7X). European, FTA, may only be German language, capable of Dr. Overflow software. SF#95, p. 14.

Nokia 9200/9600. When equipped with proper software, does Aurora, pay-TV services provided software has been "patched" with "Sandra" or similar program. See SF#95, p. 14, SF#96 p. 15. SatWorld 61-3-9773-9270 (www.satworld.com.au)

Pace DGT400. Originally Galaxy (Now Foxtel+Austar). Irdeto, some FTA with difficulty (Foxtel Australia 1300-360818). UECs replacing; Aug 29 (2003) "drop-dead" day; all were to have been "turned off" on that date (in fact, it appears "drop dead" meant replace with new Titan/Atlas IRD by August 29).

Pace DVR500. Original DGT400 modified for NBC (PAS-2)/RSA use, with CAM equivalent to DGT400 but more reliable.

Pace "Worldbox" (DSR-620 in NZ). Non-DVB compliant NDS CA including Sky NZ, no FTA; similar "Zenith" version.

Panasat 520/630/635. MCPC FTA, Irdeto capable, forerunner UEC 642, 660. Out of production, spares fax ++27-31-593-370. No longer wotrk with Austar/Foxtel.

Panasonic TU-DS10. FTA + Irdeto CA; one of 2 IRDs approved by Optus for Aurora, but never available in Australia.

Phoenix 111, 222. PowVu capable, NTSC, graphics, ease of use. (111 review SF#57). SATECH(below)- 222; terminated

Phoenix 333. FTA SCPC, MCPC, analogue + dish mover. Detailed SF review SF#51. SATECH 61-3-9553-3399.

Pioneer T84. Mediaguard CA (no FTA), embedded Msym, FEC, only for Canal+Satellite (AntenneCal ++687-43.81.56)

PowerVu (D9223, 9225, 9234). Non-DVB compliant MPEG-2 unless loaded with software through ESPN Boot Loader (see below). Primarily sold for proprietary CA (NHK, GWN+ PAS-2 Ku, CMT etc). Scientific Atlanta 61-2-9452-3388.

Prosat 2102S. FTA SCPC/MCPC, NTSC/PAL, SCART + RCA. Sciteq 61-8-9306-3738.

SatCruiser DSR-101. FTA SCPC/MCPC, PowVu, NTSC/PAL. (Skyvision Australia 61-3-9888-7491, Telsat 64-6-356-3749)

SatCruiser DSR-201P. FTA SCPC/MCPC, PowVu, NTSC/PAL, analogue, positioner - (Skyvision - see above).

Strong Technologies SRT2620. SCPC, MCPC FTA, exc sensitivity, ease use, programming. Review SF#91 (ph. below).

Strong SRT 4600. SCPC, MCPC, PowerVu; exc graphics, ease of use, review SF#64. Strong Technologies 61-3-8795-7990.

Strong 4800. SCPC, MCPC, embedded Irdeto+ CAM slots, Aurora. Strong Technologies 61-3-8795-7990.

Strong 4800 II. SCPC, MCPC CAM slots x 2 for Aurora +, Zee, Canal +. Strong Technologies (above); review SF#103.

Strong 4890. SCPC, MCPC, 30Gb PVR, 2 CAM slots, DiSEqC 1.0, 1.2 (review SF#84); Strong Technologies, # above.

UEC Atlas/Titan. New July 2003, replacing DGT400 for Austar. No SCART, L-band loop; also available Rural Electronics 61-2-6361 3636.

UEC642. Designed for Aurora (Irdeto), approved by Optus; w/new software, C-band FTA; faultyP/S. Norsat 61-8-9451-8300.

UEC660. Upgraded UEC642, used by Sky Racing Aust., Foxtel-limited FTA. (Nationwide - 61-7-3252-2947); P/S problems.

UEC700/720. Single chip Irdeto built-in design for Foxtel; unfriendly for FTA. Power supply problems, seldom sold to consumers; propensity to fall off back of trucks.

Winersat DigiBox 200. C + Ku basic receiver but includes Teletext for NZ TVOne, 2 VBI. Satlink NZ, fax 64-9-814-9447

Xanadu. DVB compliant special-priced receiver for members of SPACE Pacific (Av-comm Pty Ltd, tel +61-2-9939-4377)

Accessories:

Aurora smart cards. New v1.6 now available, 1.2 no longer available for RABS. Price now A$105, Sciteq 61-8-9306-3738.

PowerVu Software Upgrade: PAS-8, 4020/1130Hz, Sr 26.470, 3/4; pgm ch 11 and follow instructions (do not leave early!)

WITH THE OBSERVERS

AT PRESS DEADLINE

AsiaSat 4 (122E). Suggest scanning V and H every week - new stuff coming! I701 Ku service for Canal + - significant variations in fringe area reception levels in NZ reported mid August onward; normally January - March is peak signal level period; recent changes equal for day or two those levels, abruptly dropping off.

AsiaSat 3S/ 105.5E: "Indus-Plus is replacing Indus News 4115Vt FTA, Sr 3.331, 3/45 (VPID 308, APID 256)" (**Frederick**). "As announced in SF#108, Channel News Asia is now regular on 3706Hz, FTA, Sr 6.000, 3/4 VPIDs 1160 and 1260, APIDs 1120 and 1220" (**Terry**).

Gorizont 31/ moving: "This satellite (inclined +/- 3.0) is moving to an easterly location from previous 103.0E location." (**Barney**).

NSS 6/ 96E: "MUX on 12.729Vt is in a state of transition; apparently they are testing various feeds, probably without charge, to develop customer base (Sr 27.500, 7/8)" (**Reggie**). "Late in August, the 12.797Vt line-up consisted of: (1) NTD TV - Chinese (2.305 Mbit/s), (2) FTV - Fashion TV (2.628 Mbit/s), (3) TGRT - with two sound tracks, also on TARBS, (4) Telepace - apparently Italian and also labelled 'Atlantide'), (5) Video Italia - Italian music channel with teletext tests (4 Mbit/s), (6) ARM1 - apparently Italian, labelled 'C1' on screen), (7) Israel History Channel (a promotion that loops), (2.628 Mbit/s), (8) atv (Turkish - Ankara TV, also on TARBS), (9) 'SIC Internet' (Italian, also on TARBS), (10) Thai TV5, (11) TV Moda - Italian fashion channel), (12) Promo Channel - FTA, (13) MBC Europe Feed (FTA, identical to #4). The Promo channel sometimes has the screen split into 36 separate TV images from what appears to be an Egyptian cable TV network." (**DM**, NSW and **W. Richards**, Aust) "I found 12.729Vt containing (8) ESC 1 and (9) ESC 2 so anyone who finds NSS on this transponder should be prepared to identify significantly different services while their testing phase is ongoing!" (**IF**, Qld) "SE Asia beam 11.592Hz noted here, FTA, Sr 26.034, 2/3 with test card" (**AZ**, WA). "Tests on 12.688Vt, Sr 27.500, 3/4 possibly on Indian beam?" (**Shakey**).

Optus B3/ 152E: "12.407Vt, on NA beam but loading as 30.000, 2/3 apparently first transponder to be fired with traffic from the 152E location. Found (1) Tune 152, (2) CLK, (6) BTV3, (7 - 13) Sky 1 - 7 plus radio (1) Radio Retail (CA, (2) Sport 927 (CA), and 10) QTAB (CA) (**VT**, NSW).

Optus B1/ 160E: "SBS MUX, 12.437 Sr 12.600, 5/6 seems identical to 12.420Hz, Sr 12.600, 5/6. A third on 12.456Hz, Sr 12.600, 5/6 does not have NIT or PMT (tables) and may not actually be in use" (**DM**, NSW). "BVN, TRT (+) shut down September 1, promised back on late September 2; I wonder why?" (**PE**, NZ; Editor's note: Powering problem, they were back by early evening local time in NZ on 2nd)

Optus C1/ 156E: "Two ABC channels - 12.398Hz (#6) in widescreen and FTA as listed in SF#108, p. 20, plus, 12.598Hz (020A, 028A, 1FFE, 0115 + text 0247). This channel is CA and only on Austar channel 2. Previously these PIDs were used for the 'EXPO' channel" (NS). "All channels have vacated Austar/Foxtel MUX 12.398Hz, replaced by test card, and, 12.607Vt transponder where TVSN has been seen with new Sr of 27.800 (V308, A256)" (**Christopher**). "12.606Vt is definitely Foxtel (when operating) but with a Sr of 27.800, FEC 3/4. The UEC 642 loads these parameters with a 'Foxtel' label. Only one channel would load, as 'TEST,' with PIDs of V0134, A0100, PCR 1FFE, PMT 0020; a copy of TVSN when noted. Comparing with TVSN on 12.598Hz (FTA), there was a noticeable difference - much better definition on 12.606Vt with a video dynamic rate of 6 Mbit/s versus 3 Mbit/s on the normal 12.598Hz (**NS**).

SEE it first, direct from America. Entertainment Tonight is fed Tuesday - Saturday (Pacific time) in digital I701, 3769RHC, Sr 20.000, 7/8 mid to late mornings (NZ or Australia Eastern).

Palapa C2M/ 113E: "TVE International Asia-Africa on 4160Hz, Sr 5.632, 3/4 (VPID308, APID 208). Another mindless change for how ever long this lasts!" (**Plenty**)

PanAmSat PAS2/ 169E: "4023Vt, Sr 13.328, 3/4 golf feed V3106, A3120, SID 301" (**B. Richards**, Aust). "Women's boxing feed, 4037Hz, 2/3 V1160, A1120, SID 1 NAPSA 1; 4027 Hz, Sr 6.620, 2/3, V4140, A4120, SID401; TNT Car Racing feed" (**B. Richards**, Aust). "Contrary to late SF#108 reports, BBC + test cards are still operating on 3744V (Sr 21.500, 3/4)." (**Dennis S**; Editor's note: Apparently they were shut down just as we went to press, temporarily).

PanAmSat PAS-8/ 166.5E: "As predicted in SF, Pinoy Central TV (Philippines) went CA (3718Vt)" (**Teddy R**).

Thaicom 2-3/ 78E: "Sky Channel Australia bouquet (3.695, Sr 5.000, 3/4) was noted FTA late in August" (**DM**, NSW).

WITH THE OBSERVERS: Reports of new programmers, changes in established programming sources are encouraged from readers throughout the Pacific and Asian regions. Information shared here is an important tool in our ever expanding satellite TV universe. Photos of yourself, your equipment or off-air photos taken from your TV screen are welcomed. TV screen photos: If PAL or SECAM, set camera to f3.5-f5 at 1/15th second with ASA 100 film; for NTSC, change shutter speed to 1/30th. Use no flash, set camera on tripod or hold steady. Alternately submit any VHS speed, format reception directly to SatFACTS and we will photograph for you. Deadline for October15th issue: October 3 by mail or 5PM NZT October 5th if by fax to 64-9-406-1083 or Email skyking@clear.net.nz.

Austar's replacement of 40,000 DGT400s - give or take a few thousand "missing"

It was the largest IRD changeout in the history of satellite pay-TV in the Pacific; a reported 40,000 1996-era Pace DGT400s sent to the tip with replacements coming from UEC with strange names like "Titan" or "Atlas/G3." Austar broke the 40,000 replacement challenge down into "phases" apparently dealing with around 5,000 IRDs at a time. The replacement units went by courier/post to all subscribers known to have DGT400s operating with self-install instructions. When that broke down, Austar scheduled real human installers to do the job.

Most reports say it went "surprisingly well" - a tribute to Austar planning, the relative ease of making the new IRDs work, and plenty of luck.

The new UEC models are approximately 1/2 the "footprint" of the replaced DGT400s (360 x 215mm DGT400; 265 x 170 Titan). The rear deck lacks LNB loop thru and SCART although it does include S-Video output, a telephone jack, and data socket.

The message here, perhaps, is that Austar is not planning to provide HDTV thruput but it does hope to capture additional subscribers with two-way telephone connected peripheral services. The consumer manual supplied with the Titan is all words - not a single diagram or drawing (nor instruction) for integrating the new receiver into anything more complex than a simplistic dish>LNB>downline>IRD>TV set system.

A hint of "to come" is found in the software already in the IRD when installed. Austar's (12.278Hz) data channel includes some simplistic "games" and there are tests for "T mail" as well. The much overused word "Interactive" appears frequently in the instruction guide, hyping their apparent plan to offer additional services which at user option can be downloaded to the receiver. For example, "Ludi TV" (which has not been a money spinner for New Zealand's Sky TV) offers 5 games for $5 per month. The "hook" is users can "compete" with others on the "system" and have their scores posted and even win prizes (is this not a disguised form of gambling?). The new software provides a high quality EPG/TV Guide, an unusual "Channel Surfing" option (pressing "i" creates a bar along the bottom of the screen where text appears telling you what programming is currently running on other channels). The system also allows "coming up" programme information to appear, and users can set "viewing reminders" which flag your attention if the time for a programme comes and you are on the wrong channel previously bookmarked. All of this will require some extended user education, and no manual will ever replace hands-on-RCU playing. Not everyone will find this enjoyable, and getting locked into the many subroutines can be a frustrating experience (EXIT will eventually get you back to simply watching TV). Austar is betting people want to do more with their TV than simply change channels. That may prove true in a generation or two but today it simply becomes a new, perhaps unwanted challenge to locating the evening's Footy telecast.

Annoying department. "Channel Enhancements" is a system allowing Nickelodeon, [V] and Weather Channel viewers to "participate" with the telecast. So users won't "forget" this extra feature, a small logo/bug reading "OK" sits permanently on the screen. Extended channel viewing may create logo/bug screen burn-in, especially on Plasma sets!

Soapbox: "I recall an article in SF about a fellow who accidentally changed the setting for the frequency for receiving the remote control, making the Nokia unusable. There is a reset for DVB2000 software, back to original settings, without using the remote. (1) Power the IRD down at the mains (preferably with a switch at the powerpoint); (2) Hold down all three front-panel push buttons. This is best done if the cover in front of the CAM is removed; (3) While still holding the switches (down, on), repower the Nokia; (4) When the word "ERASE" appears on the display, release the switches. The DVB2000 will then load with the default settings. Note - this does not delete channels that were previously stored. (**AI**, NSW). "Intelsat advises, 'Spot 1 on I804 (176E) is (presently) pointed over New Zealand using linear vertical; Spot 2 from the same bird is directed over Australia and it is linear horizontal'. I have very strong signals on 12.610 and 12.648 here" (**Steve Johnson**, NZ) "MPEG-4 married to Windows Media 9 looks like a serious challenge to MPEG-2, even before there is a planet-wide transition to the present DVB-T and DVB-S 'standard'. MPEG-4 working to WM9 allows the same apparent video 'quality' to be transmitted using as little as 1/3rd the bandwidth (data space) consumed by MPEG-2. Broadcasters are gearing up for 2005's introduction of WM9 on their own circuits; will it ever end?" (**RB**, UK - Editor's note: Not soon. We are aware of a 384kbps package that allows someone to transmit full motion, full colour in a very innovative way. All we presently see is the 'tip' of this iceberg!) "ATS/Austar is trying to stick-it-to all remote area installers. They are offering a bit more for installation/ service calls ($140 install, $70 service call) but without regard to the travel distance and time consumed. Any deal that ignores these elements is a non-deal for those who see installations as a real full-time business, not a spare time hobby." (**AO**, rural NSW) "I understand the older style Panasat IRD 630 has a 'secret menu' capable of programming in SCPC channels (those with symbol rates below 15.000). If this is true, does anyone know where on the web I can locate this information?" (**fungainyagwaya@yahoo.com**) "On August 24 (a Sunday) everyone in WA lost WIN, right in the middle of an AFL Footy match. One newspaper report said the loss was because of a high rainfall in Sydney while another blamed a power outage at WA Wollongong that also somehow consumed their backup powering system." (**PH**, NSW) "NDS (the folks who design Muroch's encryption technology) has acquired assets from Interactive TV Technology, a French company which went into receivership after developing interactive appellation authoring tools." (**Gerard**) "I live in north of WA where until C1 there was no reasonable size dish reception from any of the pay-TV

channels. Now I have TVSN loud and clear so I called Foxtel to ask for a subscription. Their response was: 'Sorry sir, but I cannot subscribe you until the service is switched on officially; until the agreements are finalised.' Not sure what the heck this means except that it appears I have to wait until Foxtel is NDS equipped and who knows when that will be!" (**EF**, WA) "During the past 24 hours (August 21) Optus has made changes in 12.398Hz as SF reported (p. 30, SF#108). The ABC widescreen channel which previously had a 2.5 Mbit/s peak reading came back into operation August 20th, apparently after they read SF #108, but it is not ABC widescreen - rather it is a test card (VPID 0200) with no audio. The test pattern is similar to the 12.407Vt Aurora 'Tune' channel but without the scrolling text. The Aurora tune channel with moving text has a video data rate of 1.44 Mbit/s, so I expected the non-scrolling channel to be less. But Optus, apparently attempting to 'make a point' has a static 4 Mbit/s. As this was (at the time) the only video channel running on 12.398Hz, they could 'afford' the extra bandwidth at a constant 4 Mbit/s. Between 3 and 6PM (Australia Eastern) today Optus was running the entire 12.398Hz transponder FTA. This is where Optus moved the ABC, replacing 'EXPO' (which moved to 12.558Hz). The real ABC widescreen is currently (as this is reported) on 12.598Hz, VPID 020A, APID 028A, PCR 1FFE, PMT 0115 and text 0247. By dropping the encryption it was much easier to measure the peak video data rate; 4 Mbit/s. Using the same (Nokia DVB2000) IRD, I took this opportunity to remeasure the Fox Footy Channel on 12.518Hz. Previously it had a peak video data rate of 6.5 Mbit/s; today it has a peak of only 4 Mbit/s. However, the balance of the Footy channels (labelled 'FFX') still have peak video data rates of 6.5 Mbit/s." (**NS**, NSW) "Hot Chip Technology is advertising the Dreambox on their website for A$750; surely the best advertised price yet seen (www.hotchip.com.au); without a hard drive." (**DM**, NSW) "Warning: Aurora Tune (C1, 12.407Vt, 30.000, 2/3) that loads as 'Tune 152' has the precise same video and audio content as B3's 12.407 (30.000, 2/3) which makes it easy for someone thinking they are loading C1 (or B3) to actually be on the 'other' bird!" (**IF**, Queensland). "I invite folks in the Pacific to check out http://sat-industry.net/ for lots of topical discussions" (**JS**, NSW) "Optus screw-up or planned? They say they cannot supply Irdeto 1 smartcards for Aurora and cannot release newer Irdeto 2 smartcards until some date certain they will not specify!" (**AR**, NSW). "For owners of the popular Pace MS138G analogue receiver, here is how to defeat the blue screen on weak signals. Press F and then press store. To reset the PIN to (factory default) of 1234 and unlock all functions, hold down the STANDBY button on the receiver while repowering from the mains. If the channel name is permanently on the screen, it can be eliminated by pressing "i" and then STORE." (**IF**, Qld). "News reports appearing in Australian papers identify Singleton, Musselbrook, Maitland and Rutherford as 'pay TV piracy hot spots'. Austar (and Foxtel) analyse which communities seem to have below average/median pay-TV subscriptions, deducing from this where piracy cards have made an impact." (**DL**, NSW) "While USA regulatory bodies sort through Murdoch's applications to purchase DirecTV, the litigants in NDS versus DirecTV have declared a 'truce' pending a decision on the purchase. Once again Murdoch is sliding out through a crack in the wall!" (**John T**, California)

AT Sign-off

Why Sky NZ FTA Channels are CA

Many have pondered why TVNZ's TV One and TV2 remain FTA on their 1/2 transponder (B1, 12.456Vt) while the same two channels are CA in Sky's MUX on the same satellite. Various detailed news reports, including The New Zealand Herald (August 23-24), sheds new light on this enigma.

There are those, not many but some none the less, who believe that if the "basic" New Zealand terrestrial FTA channels were provided free to air via satellite, there would be a "business" here for FTA installers. Lacking FTA status for TV3, Prime and TV4 (presently only available on Sky, for a fee), the market becomes very minuscule for those homes willing to settle for only TV One and TV2 (FTA).

Sky's management people are exceedingly clever and they have been exceptional at what they do from day one. When their "penetration" of homes with Sky (satellite) digital was approaching 20%, they negotiated agreements with TV3, Prime and TV4 to add these channels to their bouquet. This had the immediate effect of allowing Sky to say to would-be customers, "with the exception of TV One and TV2, you will no longer require a terrestrial (VHF/UHF) aerial. All of your viewing will be on one remote (the Sky remote) and channels will be selected there."

At that point in time they would have also loved to have TV One and TV2 as well within their bouquet but these state-operated telecasters had their own sideways plan to create with Telstra-Saturn a competitive MUX that would include not only their two channels but the other FTA terrestrials as well as a mixture of pay (subscription) services. Alas, that deal fell apart at the 11th hour leaving TV One and TV2 at a serious disadvantage when it came to being selected for viewing by Sky digital customers. What was happening was this. Sky customers with TV3, Prime and TV4 on their satellite IRD remotes could swap back and forth within a bouquet of channels. But if they wanted to watch TV One and/or TV2, this required a switching to the TV set's remote and pushing new buttons returning to a terrestrial aerial. For many people, channel surfing using the one Sky remote was as far as they wanted to go in selecting programming. Increasingly, TV One and TV2 were being skipped because it was "a bother" to set one remote down and start over with a new one. For technology-impaired viewers, and there are many, two remotes was simply one too many to navigate.

So TVNZ capitulated and agreed to become a part of the Sky bouquet as long as Sky agreed to placing TV One on remote control position 1, TV2 on remote control position 2. Oh yes - Sky also had to agree to allow TVNZ to parallel transmit TV One and TV2 in a FTA format on their 12.456. There were other side agreements, none affect this topic directly.

Now that Sky is rapidly approaching and will within a few months surpass 40% penetration of all homes, TVNZ's decision upon reflection seems like it was the correct one. Certainly for Sky it was a "win-win" scenario. Now, with TV One and TV2 on board their MUX, they could say to potential customers, "all of your TV viewing is on one remote through your Sky digital box."

But there are some problems here. First of all, as The New Zealand Herald correctly reported, TVNZ competitors TV3, Prime and TV4 are on satellite and only available CA because of a side agreement; Sky will *not charge* the broadcasters for the satellite "bandwidth" they occupy (for a set period of years after which there will be a charge). But that "free carriage" only extends to the broadcasters allowing their channels to be a part of the "encrypted" data stream. Which means, TV3, Prime and TV4 could revert to FTA by asking Sky to charge them for the satellite bandwidth *earlier* than they ultimately will anyhow.

Sky is betting, and it is likely to be a safe bet, that by the time it comes around to paying for their bandwidth, TV3, Prime and TV4 will be so dependent upon Sky delivery of their channels to Sky digital equipped homes that they could not afford to leave the Sky service.

Meanwhile the New Zealand Government enters the picture pondering how to create a "digital transition scenario" for the country. The Government owns a two channel network (TV One and TV2) which virtually dominate viewing habits and it also owns a transmission company (BCL) which equips and operates the nation-wide system of mountain and hilltop transmitters plus intra-site links that tie the entire country together. The need for more than 900 TV One and TV2 transmitters on nearly 450 mountain and hilltop sites evaporates - goes away - overnight if there is no terrestrial digital system approved and built to replace the existing analogue network(s). BCL's cash flow, perhaps 60% dependent on the continued operation of these sites, is therefore directly linked to a continuation of terrestrial broadcasting - whether analogue or digital.

Nero fiddled while Rome burned. *History repeats.* While Government wrestles with how to transition to digital, and BCL teeters on collapse if the decision comes out favouring digital satellite, Sky grows. Forty percent penetration early in 2004, 50% by 2006, 70% forecast by 2010. For each 1% additional Sky satellite digital penetration, there are approximately 20,000 TV sets which have no reason to even *consider* digital *terrestrial.* Ten percent additional penetration, 200,000 TV sets located in homes where digital terrestrial will be a non-event.

There are of course other factors. Terrestrial broadcasters own "plant" which here is defined as a certain number of TV transmitters and their intra-site links. These assets appear on their financial statements, pumping up their overall "bank value." If all TV, in the digital transition, ends up being satellite delivered, TV3 assets will diminish by the write down and then write-off value of their no-longer used terrestrial broadcasting equipment.

Sky management worked all of this out five years ago. The terrestrial broadcasters are *still* groping to understand why they have lost control of their product to a company they consider their number one medium and long term competitor.

Losers. But the real losers in this scenario are the viewers. They are one TV-per-step losing access to *free-to-air* television. Sky's installation fee ($200 upwards) for a dish system plus $17.29 per month (the Sky fee covering "rental" of the equipment) is not merely for the month of installation - it is forever.

In 36 months, $622.44. Sky may have placed TV3 (etc.) on satellite without charging *the broadcasters* but it happened only because they worked out a way to charge viewers.

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Hard Core (Serious) "How to do it" References

☐ Tech Bulletin (TB) **9402**: MATV (master antenna terrestrial) systems - wiring up a home, motel, hotel, camp site from one set of antennas - $15 all regions

☐ TB **9404**: Home Satellite Dish Systems. "Newbie" trying to work out what all those terms means and how a home system goes together? Perfect. $15 all regions

☐ TB**9405**: Satellite to Room Systems. Combining MATV (9402) with satellite (9404) to distribute satellite TV reception to multiple outlets - 2 to 1000+! $15 all regions.

☐ TB**9301**: Terrestrial Antenna Systems to eliminate co-channel interference, stack for additional gain. $15 all regions.

☐ TB**9302**: (Terrestrial) Weak Signal Reception Techniques; off-air TV reception to 300km+. Seriously detailed. $15 all regions.

☐ TB**9303**: UHF - Big Antennas for 300km reception over ground! Seriously detailed. $15 all regions.

☐ TB**9304**: Identifying and eliminating noise interference from fence lines, signs, electrical appliances. How to cleanup marginal TV reception. $15 all areas.

☐ TB**9305**: Cable TV - the basics. How a cable system works, how you can build one! $15 all regions.

☐ **Nelson Parabolic Manual**. The "bible" of building your own 13 foot dish from scratch. Serious stuff for dedicated builders. $15 all regions (supply limited).

SOFT CORE - recent back issues of SatFACTS (while supply lasts)

☐ **SF#93** (May 2002) - European Piracy, hundreds of piracy web sites - $10 all regions.

☐ **SF#96** (August 2002) - Nokia BDM, Faster Channel Zapping with Nokia - $10 all regions

☐ **SF#98** (October 2002) Humax mods, Nexus PC Card, Low power FM broadcasting - $10 all regions

☐ **SF#99** (November 2002) FunCARDS - how they work, software mods for Humax - $10 all regions

☐ **SF#100** (December 2002) d-box2 BIG report! AC3 Surround Sound for Nokia, PanAmSat's Terrorist Problem - $10 all regions

☐ **SF#101** (January 2003) d-box2 conversion to Linux, SA power supplies - $10 all regions

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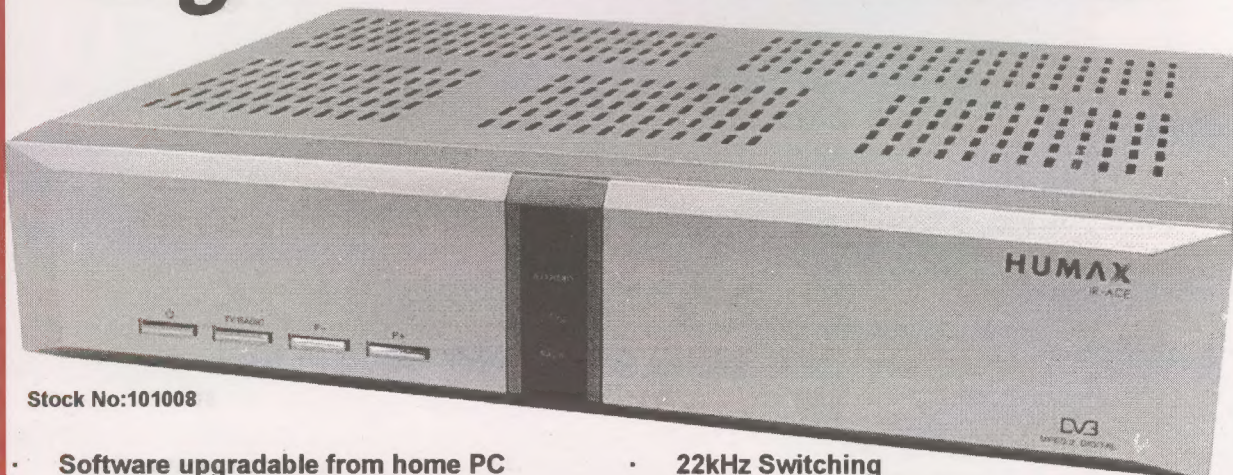
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Input Connector	F-type, IEC 169-24, Female
Frequency Range	950 ~ 2150 MHz
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IF Frequency	480 MHz
IF Band width	36 MHz
LNB Power & Polarization	Vertical: +13.5 V Horizontal: +18 V Current: Max. 500 mA, Overload Protection
22 kHz Tone	Frequency: 22±4 kHz Amplitude: 0.6±0.2 V
DiSEqC Control	Version 1.0/1.2 Compatible
Demodulation	QPSK
Input Symbol Rate	1 - 45 Msym
FEC Decoder	Convolutional Code Rate 1/2, 2/3, 3/4, 5/6 and 7/8 with Constraint Length K=7

A/V & Data In/Out

VIDEO	RCA/Cinch, Video Output (CVBS)
AUDIO R/L	RCA/Cinch Volume and Mute Control (Resolution: 20 bits DAC, Max. 2 Vrms)

Data Port

RS 232C	Transfer rate 115 Kbps 9 pin D-sub Type

MPEG Transport Stream A/V Decoding

Transport Stream	MPEG-2 ISO/IEC 13818
Profile Level	MPEG-2 MP@ML
Input Rate	Max. 15 Mbit/s
Aspect Ratio	4:3, 16:9
Video Resolution	720 x 576, 720 x 480
Audio Decoding	MPEG/MusiCam Layer I & II
Audio Mode	Single channel/Dual channel Joint stereo/Stereo
Sampling Rate	32, 44.1 and 48 kHz
Graphic Engine	3-OSD plane 1-background plane H/W Bit Blit ~16 bits color

RF-Modulator

RF-Connector	75 Ω , IEC 169-2, Male/Female
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Output Channel	CH21 - 69 for the Remodulator
TV standard	PAL B/G/I/D/K selectable by Menu

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